MONTHLY

JOURNAL OF AGRICULTURE.

VOL. II. FEBRUARY, 1847. NO. 8.

CHEMISTRY AS APPLIED TO AGRICULTURE.

THE OBLIGATION OF GOVERNMENTS TO PROMOTE SCHOLASTIC INSTRUCTION IN THE ART OF HUSBANDRY.

THERE would, we must confess, be no violence in the presumption that we had stolen a leaf from the book of the esteemed author of the following Report, when we very hastily penned, for the last number of THE FARMERS' LIBRARY, the following query: "Ought not every State, or Agricultural Society or Institute, that possesses the means of doing it, to *employ a competent chemist*, whose duty it should be, for the benefit of its Agriculture, to analyze such soils and substances as might be sent to him for that purpose from the different parts of the State? Could any more useful office be well established?"

Coincident as are our views with Mr. NAILL's, and gratified as we are to find them so, it was only the coincidence of different minds, animated by the same spirit of devotion to the same object. It was only since our remarks were in type, that a chance, fortunately for us, brought us acquainted with Mr. N.; and to learn, incidentally, that as far back as *March*, 1840, exactly at the time that we were called upon to take charge of an important Bureau of the public service at Washington—and so had our attention partially diverted, but never entirely withdrawn from the interests of Agriculture—he, as Chairman of the Committee of Agriculture in the Senate of Maryland, had actually presented to that body the following Report, and Bill in conformity with it, for the establishment of just such an office—one that, with some modifications, every enlightened friend of Agriculture must see could not fail to be attended with the most important benefits to that branch of the State's industry:

HOUSE OF DELEGATES, March 5, 1840.

Mr. NAILL, from the Committee on Agriculture, delivered the following Report:

The Committee on Agriculture, taking into consideration the deranged condition of the finances of the State, and the difficulties into which she has been thrown by her system of internal improvements, beg leave to submit the following Report:

Your Committee, regarding the agricultural product of the State as the great basis upon which all her various interests mainly depend, and as almost the only source from which returning prosperity may be expected to flow, have been deeply impressed with the importance of the subject and induced to inquire whether anything could be done to augment the agricultural product of the State. It is admitted, on all hands, they believe, that knowledge is power; consequently, if means be adopted to extend knowledge, an increase of power will follow. Thus, then, if the mind of the State be cultivated, will it not lead to the better cultivation of the soil? And who can estimate the mighty results that may be

made to flow from these two great primary sources of wealth, the mind of the State and the soil of the State? If they remain uncultivated, must not the wealth and power of the State remain stationary? It is appalling to reflect upon the amount of capital, enterprise and population that have left the State in the last thirty years. Can it be believed that these masses of citizens would have left the places of their nativity, and all those hallowed recollections, and foregone the advantages of an Atlantic market, if they had been taught to appreciate the value of *marl and lime* in the renovation of exhausted lands? Your Committee think that it cannot, and entertain the belief that when the properties and effects of those agents are more generally understood by the farmer, and their application regulated by analysis, universal confidence in their use will be established and uniform success attend their application. In proportion as the means of rendering home agreeable and business profitable would be increased, emigration would subside, and capital and population become fixed.

Your Committee propose, by the accompanying bill, to take a small pittance from the coffers of the State to further this great object, assuring the Legislature, and their fellow-citizens throughout the State, that it has been prompted by a high sense of duty, and under a conviction that it will be returned many thousand fold, not only in the increased products of Agriculture and its influence upon all other business, but in awakening a thirst for, and disseminating knowledge among our people, that great palladium of our liberty and security.

All of which is respectfully submitted.

From the Committee. D. W. NAILL.

Mr. NAILL, from the Committee on Agriculture, reported a bill entitled "An Act to provide for the appointment of an Agricultural Chemist for the State of Maryland."

An Act to provide for the appointment of an Agricultural Chemist for the State of Maryland.

SECTION 1. *Be it enacted by the General Assembly of Maryland,* That the Governor, by and with the advice and consent of the Senate, shall annually, hereafter, appoint and commission a person of talents, integrity and suitable scientific attainments, as Agricultural Chemist of the State of Maryland; and the said officer shall receive in consideration of the faithful performance of his respective duties, an annual salary of —— dollars, to be paid as the salaries of the other civil officers of the State are or may be directed to be paid

SEC. 2. *And be it enacted,* That the State be, and the same is, hereby divided into three Districts, viz.: The First Gubernatorial District shall constitute the First District; the Third Gubernatorial District shall constitute the Second District; and the remaining Gubernatorial District the Third District; and that it shall be the duty of the said officer to visit the First District during the year 1841, the Second during the year 1842, and the Third during the year 1843.

SEC. 3. *And be it enacted,* That it shall be the duty of the Agricultural Chemist, to be appointed as aforesaid, to deliver a course of public Lectures on Agricultural Chemistry in each County embraced within each of the said Gubernatorial Districts as aforesaid, and analyze not less than three different soils in each County in each year, and shall also, as far as time will permit, visit such places where valuable marls or minerals are believed to be, and examine and report the same to the Legislature, together with all his proceedings during each year.

Without stopping to discuss the details of a proposition so honorable in its general features to the judgment and forecast of its author, we feel called upon to record it in this Journal, on the principle that the enterprising pioneer blazes certain trees in his progress through the wilderness, for the benefit of those who may come after him. Notwithstanding the apathy that has so long pervaded the cultivators of the soil as to their claim on the Government and the advantages to be derived from having the lights of science reflected on the course of the plow, the time may yet come when this movement of Mr. Naill may be looked back to and regarded with something of that grateful reverence with which we view the spots where our hardy ancestors first opened settlements and kindled the fires of civilization in a land of savages. Even now may we not ask, could stronger proof be adduced of the supineness of the agricultural community—of their habit of overrating all other concerns and depreciating their own—than is to be found in the coldness with which this enlightened proposition seems to have been received, and the quick oblivion into which it had been allowed to fall? Yes, without meaning any flattery to the author, when we consider his previously retired mode of life and limited opportunities, and the almost total absence of all sympathy and encouragement from the community or the press, we may truly call it an enlightened proposition, much, it seems, in advance

of public sentiment and the circumstances of the times and the country. But let us at least hope that the day will come—we trust it is not far distant—when those who should have lent a joyful countenance to at least this one legislative movement for the benefit of those who constitute so large a majority of the people of the State, will awaken to a sense of that self-respect, failing in which men need never hope to be respected by others. Where—how employed, has been *the press* of the State, that *it* did not hail and encourage this one public effort to provide for her greatest interest, that augmented power and increased prosperity which always flow from augmented knowledge? Alas! the sympathies of the press of our country are almost universally allied to and dependent upon other branches of industry. Look at the buoys that have been anchored out, the light-houses that have been built, the breakwaters constructed, the banks incorporated, the hospitals erected, the schools and academies supported, surgeons and chaplains provided, and the vast amount of expenditure bestowed for enlightening, protecting, and invigorating commercial, and warlike, and all other particular classes and pursuits, while Agriculture, which supports them all, is left to grope its way in the dark, like a blind giant, and is only not ridden down and killed right out because then these other classes would infallibly perish.

Agriculture, and the various classes that subsist on the fruits of agricultural industry, may be likened to a great sow, with a large litter of pigs. If you would have them fatten and grow apace, *she* must be well fed and cared for; but if she has not sense enough to know where to find her sustenance, and is too lazy to hunt for it, the litter that tug at her sides, caring only for themselves, will suck out her very vitals.

As to the advantage of special instruction in Agriculture, it is only when men have the hardihood or stupidity to maintain that ignorance gives efficiency to labor, and that the short-sighted man is best able to provide for the future, that they will come to deny that the cultivation of the earth will be more successful and productive in proportion as the youth of a country is reared in a knowledge of the sciences that explain all the phenomena of animal and vegetable growth, the principles involved in them, and the laws by which they are regulated. This being once admitted, and all that the friends of agricultural instruction contend for follows of course. If Government has any power to protect, or what is the same thing, to favor a particular class—as the military, for instance—by boarding and educating them at the public expense—being virtually at the expense of the landed interest—it surely ought to have the power to let that interest appropriate some of its own means to the purpose of self-enlightenment in the principles of its own pursuit. And which, let us ask, is the more useful appropriation of the public treasure in this republican country—that which should be applied to diffuse among farmers the mathematical principles and the knowledge of engineering or of chemistry, that would enable them to construct a road, or a bridge, or a canal, or to build or understand the mechanism of a threshing-machine, or to analyze mineral or vegetable substances in a manner to determine their fertilizing or nutritive qualities—or that appropriation of public money which should be employed to teach our youth the art of constructing a gun-carriage, or how to make a bomb-shell or a rocket? We don't ask, by the knowledge and use of which does a man gain the most *eclat* or the highest pay, or which will the more readily insure him a place for his son in the Army or the Navy, or the comforts of a hospital for himself, or a pension for his wife? We ask, which of these appropriations would most conduce to *the substantial interests of those who make*

the laws and pay the taxes? Very well do we know that if Mr. NAILL, for example, had himself the means of carrying out his patriotic conceptions and designs for the benefit of Agriculture, until, by increased knowledge of all the laws on which its productiveness depends, its fruits should be quadrupled from a given amount of land or labor, he would yet, if overtaken by sickness and misfortune, be left by the people and the Government of this republican country, to perish in a common jail; while honors and rewards without measure would be heaped upon any man who should come reeking from the battle-field, and whose only merit should be that of having shed the blood of——"the enemies of his country"!!!

Can any man endowed with the high, the—as we regard it—almost sacred trust of legislation, the most honorable and responsible that any man can fill, unless it be that of instructor of youth—can any man so endowed with power to influence the public weal, need any argument, at this time of day, to convince him how absolutely and directly the success and the honor of Agriculture are connected with and depend upon those who follow it, or at least those who direct its operations, being trained up in familiarity with those sciences that enable us to detect the nature of various soils, and the constituents that compose not them merely, but all the plants we cultivate, and all the manures which the most ignorant acknowledge and apply, though without knowing why, to promote their growth? Just as well might it be said that a knowledge of anatomy is not essential to the surgeon—that the iron-master may be ignorant of the qualities of ores, and the art of smelting—or the dyer of his coloring matters, and how to fix them. We don't speak of or to the common farm-laborer any more than of the journeyman dyer. Both may be as ignorant as an ass, and, like an ass, be employed in the lowest drudgery, content to labor and be fed from day to day.—What we write, such as it is, we intend for gentlemen, and gentlemen's sons; and by these we mean men who pride themselves and covet the distinction that is to be found, not in money nor in fine clothes, but in the highest possession they can reach of the qualities that distinguish the man from the brute—the *intellectual farmer* from the *unintellectual operative.* It is knowledge that humanizes, civilizes, elevates and adorns the human character. Ignorance brutalizes and degrades—makes men tyrannical and cruel, yet cowardly and fond of blood. We go, therefore, above all things, for knowledge; and, first of all, for knowledge of the very sort that makes a man *most skillful and prosperous in the very business by which he is to support himself and family,* without which he must be miserable. For the sea, he who wishes not to live and die a common sailor, learns the art of navigation; he gets acquainted with the form and magnitude of the earth—procures his charts of the coasts, and maps of the harbors he may have occasion to visit. He must understand the use of instruments by which the direction in which the ship is steered, and the distance she sails, are ascertained from day to day; and be able to deduce, from the data supplied by such instruments, the situation of his ship at any time, and to find the direction and distance of any place to which she is to be taken. Observe the elegance and beauty of the art which forms our splendid flint-glass out of such coarse, mean materials as silica, potash, and oxide of lead. Now are these arts, does the reader suppose, to be acquired without study? without exercise of the mind? without bringing into play the noble faculties that lift us above the beasts of the field, and assimilate us to our Creator in the only way that it can be done without an insult to Infinite perfection? And will the farmer, the practitioner of the greatest of all arts—he who with soil, and soda, and lime, and potash, and wa-

ter, and various materials, *manufactures* the very *staff of life*—will he be the first to degrade his own employment, to disown its connection with science, to stultify himself, and place on the same level of brute force the occupation of his sons and his oxen?

The views which present themselves to illustrate the immense auxiliary power of science in the prosecution of agricultural industry, and the obligation of those who represent the landed interest to provide for the instruction of the sons of their constituents in a better knowledge of the principles on which all material advancement in Agriculture must depend, are really so obvious, and we might say innumerable, that one hardly knows which to select by way of argument—if, indeed, it be practicable to bring oneself to recognize the necessity of adducing any argument in such a case. It is not, we apprehend, that public men—legislators—representatives, so called, of the landed interest, but really more attentive and alive to all others than to that—it is not, we apprehend, that they do not see how much the whole country would be elevated in character, and Agriculture be made to prosper, by express instruction in all the sciences that appertain to it. The difficulty, it may be feared, is rather with the farmers themselves. Their representatives perceive their lukewarmness, in the fact that they never call them to account for the enormous sums levied on the country for protection and instruction to other classes, while they and theirs are utterly neglected. What inference can they draw when they see the Legislature of one State refusing to expend a few hundred dollars, by way of commencing a system of agricultural instruction, as in this case of Mr. NAILL's proposition for a course of lectures on Agricultural Chemistry; while sister and contiguous States, equally sensitive and slow in matters of expenditure for agricultural purposes, will yet by unanimous vote give many thousand dollars to fit out a *General Government* regiment for warlike service in a far distant country! While men betray insensibility to their own welfare, how can they expect their representatives to be mindful of it? But are there not hopeful signs of a change in public sentiment? If farmers possessed the same benefit of the *power of the press* which is enjoyed by merchants and the town classes, that change would now come over the country almost as fast as one of Espy's great storms. Then we should have educated every year, at the public expense, men prepared for diffusing a knowledge of the principles of animal and vegetable chemistry, of mineralogy, botany, road-making and bridge-building, and agricultural engineering, and architecture—in number at least equal to the number that are fed, clothed, and educated, and commissioned, and paid for life, at the expense principally of farmers, for practicing with more deadly efficiency all the arts of war. Look at the advantages, the power, that science has conferred on the civilized, over the savage warrior!—When has the former appeared that the latter has not given way, as snow melts away under the meridian sun? And can it be within the scheme of a beneficent God that science, the crowning glory of man's nature, should do less to push forward the great conservative art of cultivation, the source of every blessing, than it does for the bloody art of human slaughter? No! the very thought is impious!

But who can hope that this glorious direction will ever be given to any portion of the public means, until the holders and the cultivators of the soil shall make such demonstrations as will convince legislators that they know their rights, and, "knowing, dare maintain them"?

We have spoken of the want of sympathy on the part of the press (which so

powerfully influences public men) with rural interests. Can anything better prove the want of concert and sympathy on the part of the agriculturists themselves? For, as to numbers, take away Baltimore and New-Orleans, in the slaveholding States, and not more than one in thirty lives in towns, and even with the inhabitants of those cities, not one-sixteenth. Yet look at the spirit of legislation in all those States. In what proportion does it lean toward, or is it influenced by, *regard for the agricultural class?*

Let us see, for example, what the Agricultural Committees of the Legislatures now in session will venture even to propose toward agricultural education; and let us see *what will be granted!*

There are those who may suppose that in these hasty remarks, for instance, there may be something worthy of the consideration of the public and of public men. If so, they would naturally like to see them more widely spread; but could they get any newspaper in any of these States to give them, or anything like them, circulation? *Nous verrons.* The Editors of such papers too well understand their business to batter the face of their type in care for men who don't care for themselves.

But, as to the immediate connection between practical Agriculture and that science for which Mr. NAILL would diffuse some taste and some knowledge in Maryland, the reader is respectfully referred to the observations presented in the following chapter. If time allowed, they might be amplified and extended, and will be as opportunity may offer.

SUGGESTIONS FOR SOME REFORM IN THE COURSE OF INSTRUCTION IN COUNTRY SCHOOLS.

Let us endeavor to exemplify, in the simplest way that is possible, some of the facts and principles immediately connected with practical Agriculture, and which every boy who is to live by terraculture ought to learn at school first and before all else, as fast as he has capacity to comprehend them—yes, as invariably and for the same reason that a military student at West Point is taught, *by the Government*, the principles of fortification, gunnery, or any other branch of the military art. Ask one of these students what is *gunpowder*, and he will tell you that it is a compound of about 78 parts of saltpetre, 12 of charcoal, and 10 of sulphur; and then he will go on, for *his education* has taught him to know that its force of explosion is the consequence of the sudden and abundant production of the gaseous matter expanded by the intense heat resulting from the action of the combustibles upon the nitre; that the gases evolved are chiefly carbonic oxide, carbonic acid, nitrogen, and sulphurous acid; and that their volume exceeds two thousand times the bulk of the powder. And so he can proceed to tell you the nature of, and the difference between, all these gases. This same student, boarded, paid and educated at the public expense, will tell you at once that, in the art of gunnery, the object is to hit a proposed mark, at any distance, within the range of the shot; and then he will go on to explain that, to accomplish this purpose, it is necessary to know the nature of the path which the ball describes in the air with a given initial velocity, the quantity of powder necessary to produce that velocity, and the elevation that must be given to the gun in order to counteract the effect of gravity and the resistance of the air on the ball in its flight; and all these calculations he is taught to make. In short, he is thoroughly instructed, not only in all the branches of the military art, but in botany, mineralogy and chemistry, mining, &c., some of which are as useful and

necessary to the farmer as to the soldier. But the officer, naval or military, not only gets his four years' instruction, at the expense of the landed interest in the proportion that that interest is the most numerous and contributes most to all Government expenses, but he is paid besides, and finally insured to receive a commission and good pay for life. Now we are not finding any fault with this, but what we marvel at is that the landed interest, that class of the community on which the burden of Government chiefly falls, should require no appropriation, no assistance, no provision for instruction, also, out of the public funds, for their own sons, in their own profession. We don't say provision for board, and clothes, and pay, and life commissions, and hospitals, and pensions, with the run of the Army and Navy for their sons, but an appropriation *simply for instruction.*

We have barely hinted at the sort of instruction received at the Government schools, by the privileged classes. Now let us see how, in what branches, the rising generation destined to be cultivators of the soil are instructed. Take one of these, and, for example, instead of asking him what is gunpowder, ask an elementary question appropriate to *his* destined pursuit. Ask what is *soil?* and ten to one but he answers, soil is earth, and earth is soil! Yet, if taught in the matter and manner that every farmer's son should be taught, by men properly prepared, and qualified, and paid, as Professors are qualified at our military schools, he would not be fourteen years old before he would answer that *soil* is the primitive earth in a state of mixture with organized matter fit for the growth of plants; that the surface of the earth, in every country on which plants have grown and decayed, is properly denominated *soil;* while the earth at a foot or more beneath the surface, commonly called *subsoil*, is comparatively without organized matter, and is therefore properly denominated earth, clay, sand, gravel, lime, rocks, or stones, as the case may be.

If agriculturists were alive to their own interests and rights, animated by a proper sense of self-respect, and conscious of their power, as other classes are—enjoying, as they do, the means of complete control over that *greatest of all earthly concerns*, the *education of the youth of a country*—they would see that public instruction in the art and principles of tillage and husbandry was at least as thorough and complete, and as much out of the public treasure, as in any other art or profession. In that case, no boy, designed to be a farmer, would leave his school, and enter upon his trade, without having learned, for example, the number of elements which are found existing in plants and animals. Of these he would know how many are supplied by the atmosphere and by water (as carbon, hydrogen, nitrogen and oxygen), and that these are they which constitute by far the greatest proportion of every organic substance. He would be taught what these gases are, and what uses Nature designed them to perform; and again, he would learn, *at school*, that the remaining twelve elements, though usually present in much smaller quantity, are no less essential to the well-being of the plant, and must be obtained *from the soil* on which the plant grows. To yield all these other elements, he would of course learn that the soil must be of a complex nature. If it do not naturally contain them, or if it contain them in not sufficient quantity or proportion, he would learn, before he entered on his profession, that they must be supplied by the farmer, or he must be content to have little or no return for his labor. He need not be, nor should any country school-boy reach, 14 years of age, before he should have been taught that each crop, removing from the soil certain quantities of these elements, making a part of and indispensable

to the existence of the oats, barley, wheat, corn, tobacco, potatoes, flax, or whatever the crop may be, *must diminish in that proportion the power of the soil to produce future crops;* and thus he would learn his first great lesson, to wit: that to sustain the fertility of his land, and insure himself a remunerating return for the labor and capital employed in its cultivation, the exhausting effects of vegetation *must be compensated by suitable additions from some source.* A well-qualified, well-paid, competent instructor—such as, before many years, ought to be in the management of every country school—and might be, if legislators would do their duty—would soon make any boy of common capacity understand that, in the words of an able writer, in those few and simple propositions is contained the clue to the most refined and successful systems of Agriculture; and that the objects of the philosophical agriculturist, as well as the most effective means of practically advancing husbandry. consist in—

1. *Studying the composition of the Soil;*
2. *Studying the action of Plants upon it.*

But surely we should be wasting time in arguing farther that the farmer needs instruction in the various branches of knowledge that are allied to his pursuit, and that such instruction will give additional efficacy and profit to his labors, as much as it does to that of any other profession or employment. Instead of this, what have we taught to all the youth of the country, *until* they are singled out and favored, by the pleasure of a single individual, with a warrant that insures them a highly finished education and support for life, or until they are designated for one of the so-called *learned professions?* Why, generally, the *ultima thule* is, to be taught to *read and write*, and *there*, it is at this point, the education of the great mass of boys stops—mistaking that which constitutes only the *means* of acquiring knowledge for knowledge itself. Will somebody give us a list of the books generally employed now in the country schools? In our own time, in Maryland, they were—*Dilworth's Spelling Book*, the *New and Old Testament*, and *Scott's Lessons* or the *English Reader*. High prognostications were ventured in those days in favor of the promising lad who could come before an admiring Fourth of July audience, and pronounce with ease and confidence, "*To be or not to be*," "*My voice is still for war*," "*My name is Norval*," or "*All the world's a stage*,"—neither pupil nor master, perhaps, understanding anything of the men or the times for which these speeches *had been written.* To get by heart these fictitious orations of Pagan orators, and to pronounce them with the requisite degree of self-confidence and flippancy, was, and for aught we know is still, thought to be a sure sign that the boy would rise to great eminence not as a planter or farmer, (for the idea is that any dunce has sense enough for *that!*) but as a *doctor or a lawyer!* And the parents—good, easy people—saw in their applauded son another Patrick Henry, or Pinckney, or Rush, or Wistar, at least. And this was and is yet called *education for an agriculturist!*

Now in lieu of the speeches of Cicero against Verres, or Adherbal's to the Roman Senate, or Antony's oration over the dead body of Cæsar, we propose what will be found in the two following chapters as Fourth of July recitations, at an exhibition such as we remember in our youthful and joyous days in the country, when, with our dear school-companions, the Grays, the Wilkinsons, the Chews, the Reynolds and the Dukes, each in his turn, dressed out in his holiday clothes, we stepped out on the platform, under one of those fragrant, sweet-smelling, rude, rustic arbors, recently shaded with the fresh boughs of the chestnut and the beech. We only wish we had room for a few more of these *agricultural speeches;* but,

one of these days, we will arrange a series of them from the various branches of agricultural literature—ay, for *Agriculture has its literature.*

We beg pardon of the reader for dwelling so long on one topic, and promise not soon to offend in like manner again. But the fact is that we are so thoroughly convinced that almost all wide-spread, enduring and honorable improvement for Agriculture now lies in that direction, that our feelings run away, perhaps, with our judgment, so that we are half persuaded that it would even be not unbecoming in our *pulpit orators* to pronounce an occasional discourse on the duties and occupations of rural life, the high accomplishments that properly belong to it, and its tendency to foster sentiments of benevolence toward every living thing, and reverence for the great Creator of all.

Self-love thus pushed to social, to divine,
Gives thee to make thy neighbor's blessing thine.
Is this too little for the boundless heart?
Extend it—let thy enemies have part:
Grasp the whole worlds of reason, life and sense
In one close system of benevolence:
Happier as kinder, in whate'er degree,
And hight of bliss but hight of charity.

And now for our recitations, which we take from the works and materials supplied by able writers, from whom we are making up THE FARMERS' LIBRARY.

SOIL:

ITS NATURE AND ITS OFFICES.

THE soil is formed by the decomposition of the minerals, of which the crust of the globe consists. The water which flows over the surface is absorbed into the pores and fissures of the rocks; and in winter, on freezing, it expands with such irresistible force as to crumble down even the materials of the densest and hardest stone. The pulverulent or gravelly material so afforded, is carried down by rains or floods to the lower grounds, and spreading over the more level country forms the cultivable soil. Independent of the mechanical action of water, the constitution of numerous rocks is such as to cause their gradual decomposition by its chemical action, as in the case of felspar and other minerals; and by the direct action of the atmosphere, all rocks which contain protoxide of iron very rapidly decompose and crumble down. Such being the origin of the soil, its constitution will be easily understood to depend on that of the rock from which it has been formed; and as on this constitution its fertility or its power of supplying plants with the materials they require for their growth, mainly depends, it will be seen that the agricultural capabilities of a country are immediately connected with, and dependent on, its geological character. A district of which the rock is simple in constitution cannot furnish a fertile soil. A pure quartz rock, or a pure limestone, could only furnish from its soil to plants, lime or silica, and they should hence languish for want of other equally important elements. The edges of a geological district, where various rocks are in contact, will, therefore, always be more fertile as to soil than its interior, and the more numerous the rocks in the neighborhood, and the greater the diversity in their mineral character, the more complex will be the soil furnished by their decomposition, and by its power of furnishing the elements of growth to different kinds of plants, the greater will be the range and energy of its fertility. * * *

The office of the soil is not merely to afford such chemical elements as the constitution of the plant requires, but also, and what, in an agricultural point of view, is nearly of as great importance, to afford a mechanical support to the plant during its existence. This support must be consonant to the habits and structure of the plant, and hence is the special classification of soils, as adapted for the cultivation of various kinds of crops, quite independent so far of their chemical composition. Thus if we take a tenacious clay, which, when dry, becomes hard and solid, and when wet forms an impervious paste, it is evident that plants which either required to extend delicate roots to a distance, or to generate a single root of considerable bulk, could not grow there in a healthy manner; while a light and very porous soil would be adapted naturally for such crops. On the other hand, a plant of which but little stretches under ground, the stem and other portions presenting a considerable mass and surface to the air, would find in a tenacious clay a sure anchorage and support against the effects of the wind and rain. It is thus that wheat and turnip soils are almost synonymous with stiff and adhesive clays on the one hand, light and friable loams upon the other, and similar instances of the mechanical adaptation of soils to agricultural practices will have occurred in the experience of every practical farmer.

It is not merely, however, in this mechan-

ical point of view, that the physical properties of the soil become important, but also, and indeed especially, as affecting the condition of drainage of the ground. The greater or less dryness of a soil influences powerfully the nature of the vegetation it tends to nourish. The plants of a marsh differ from those of a dry upland, not merely in greater or less abundance or luxuriance, but in nature and in organization. The plant which is naturally formed for dry ground will no more flourish in a wet situation than an animal, inhabitant of the land or air, can seek its subsistence, and live habitually under water. It is, therefore, of vital importance to Agriculture, that all superfluous water should be as rapidly as possible removed. Its presence not merely affects the character of the natural vegetation, and renders the soil unfit for the cultivation of plants which belong to a dry situation, but, what is even more practical in its consequences, it retards the progress of vegetation in a very material degree, by preventing the rays of the sun from warming the substance of the soil. A certain moderate heat is indispensable to vegetation; an increase of heat, provided it did not exceed certain bounds, augments its rapidity and force in a remarkable degree, and the constitution of ordinary soil, by its dark color and rugged, dull aspect, is precisely such as to absorb the heat of the sun with most effect, so as to advance the vegetation on its surface; but if the soil be sensibly wet, no heating effect can take place, all the warmth will be absorbed in producing evaporation of water from the surface, and rather, as one may verify by holding a wet hand in the air, even before the sun, an impression of greater cold will be produced. Long experience as to the result has even fixed, in ordinary language, the word *cold* as expressing the imperfection of such soils. The remedying of this evil, as of the former one consists in relieving the soil from the excess of water which lies upon it, which is to be effected by attending to the general drainage of the district, and by lessening the retentive quality of the individual soil, where such is economically practicable

ROTATIONS.

RELATION OF GRAIN CROPS AND GREEN CROPS—AMOUNT OF FOOD PRODUCED BY VARIOUS SYSTEMS OF CULTURE—INFLUENCE OF DIFFERENT CULTURES IN THE EXHAUSTION OR AMELIORATION OF THE SOIL.

THERE is, however, another mode of restoring fertility which is of practical importance, as it has led to the greatest of all improvements in husbandry, the *rotation of crops*. A soil which has become exhausted becomes restored by lying at rest for a certain time, particularly if it be well broken up and fresh surfaces be exposed to the action of the atmosphere; in fact, then, by the decomposition of the mineral masses which the soil contains, a fresh soil is produced. The organic remains of the former crops become also rotted, and assume a form suited for the nutrition of young plants, and thus after a season's fallowing, still more after lying out of cultivation for some years, the soil resumes a very considerable degree of fertility. But it is evident that this process entails considerable loss by the land being so long idle, and it becomes of great importance to the farmer to make some use of the land while this process of regeneration is going on. This is actually done by changing from one kind of culture to another; while the land is recovering from the effects of one plant it is capable of sustaining a plant which does not act upon it in the same way, and after this a third, differently exhausting from either of the others, will give a *course* of rotation of three years, during any two of which the ground is recovering from the exhausting action of the plant grown during the third. I take this only as an example, for it is found that three years is too short a term to be of much practical utility.

In selecting the plants adapted for such a rotation, we must be guided by their chemical composition, and by their mode of growth. The results of both, however, lead to the same conclusion. In addition to those elements which are common to all plants used as food, certain plants are remarkable for the great quantity of silica they take from the soil—such are the grasses and corn plants; certain others for the potash they take up—such are turnips, the beet, the potato; others, again, for the quantity of lime—as the pea, vetch, clover, tobacco, &c. Such are the kinds of plants that should succeed each other in a rotation, and the proportionate action of each class may be judged from the following table derived from Liebig's investigations. From a space of land of 2·47 acres, he found there were taken up by

Crop.	Alkaline Salts.	Salts of Lime and Magnesia	Silica.
A crop of wheat.....	120½ lbs.	78½ lbs.	260 lbs.
A crop of peas	198½	371½	46
A crop of beet without the leaves..	361	37¾	46

The quantity of phosphates taken up by these crops are—

Peas..117 lbs. Wheat..112 lbs. Beet..37¾ lbs.

The reason of the beet taking so little phosphoric acid is, that it is not allowed to form its seed, and in all plants it is in the

seed that the phosphates are principally deposited.

From these numbers it is evident, that on such a field, if by the gradual decomposition of its soil it could furnish but 200 lbs. of alkaline salts, and 200 lbs. of lime and magnesia salts each year, we would grow upon it but half the proper crop of beet, for a full crops would require 360 lbs. of alkaline salts, and also only a half crop of peas, for the full crops would require 371 lbs. of lime and magnesia salts. The continuous culture of either plant would, therefore, be most unprofitable and injurious, but if we cultivated beet one year and peas the other, the soil would have two years to prepare the materials which each crop would require to take up in one. There would be available 400 lbs. of each kind of salts, and thus so far from exhaustion, there should be a surplus steadily increasing the fertility and augmenting the produce of the soil.

As it is seen in the above table that the quantity of alkaline and earthy salts taken up by the corn crop (wheat) is so much less than required for the other kinds of plants, and that the principal demand of the corn crop on the soil is for silica, of which we may consider it certain that no soil is in danger of being exhausted, it might appear natural to conclude that the corn crop should be at least detrimental to the ground, while it is well known to practical agriculturists that white or corn crops are among the most exhausting. Their injurious action on the soil is, however, not so much due to the inorganic materials they take up as to the nitrogen, for which element they are altogether dependent on the soil, while other kinds of plants act upon the atmosphere, absorbing nitrogen, and actually serving rather to enrich the soil upon which they grow, than in any degree to impoverish it. This is in fact what constitutes the remarkable relation between the *white crops* and *green crops* as members of a rotation. The former exhausting the soil of nitrogen, the other fixing in the soil nitrogen derived from the air, and thus preparing for the nutrition of the corn crops that may succeed it.

The complete illustration of the principle is due to Boussingault, who has established it as well by experiments on individual plants in the laboratory as by the operations of an extensive farm. Thus on growing corn in artificial soil deprived of nitrogen, it was found that the plant, when arrived at its full maturity, contained only the nitrogen that had originally existed in the seed. On the other hand, on growing peas in the same way, the quantity of nitrogen in the mature plant was found to be much greater than had been in the seed, and for this there was no other source than the atmosphere. The following tables will show how fully this result is borne out on the large scale.

In a three years' cultivation of two successive crops of wheat manured and then a year of fallow, the produce was 3,318 kilogrammes of wheat, and 7,500 kilos. straw per hectare, from 30,000 kilos. of manure. Now taking these dry, the following table shows their composition and the relation of their constituents:

Constituents.	Weight dry.	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ashes.
Wheat	2836	1037·4	164·5	1230·8	65·2	68·1
Straw	5550	2686·2	294·2	2159·0	22·2	388·5
Sum	8386	3993·6	458·7	3389·8	87·4	456·6
Manure	4140	1482·1	173·9	1068·1	82·8	1333·1
Difference	+4246	+2511·5	+284·8	+2321·7	+4·6	−876·5

It is here quite evident that the crop contained only the nitrogen of the manure, as the difference 4·6 is so slight as to be within the unavoidable errors of experiment in such cases. On the other hand, the carbon of the crop is nearly treble that of the manure, verifying in an admirable manner, the atmospheric origin of the carbon of plants, to which I have already alluded. Hydrogen and oxygen were also gained abundantly, and almost exactly in the proportions to form water.

In contradistinction to this corn culture may be placed the results of the continued growth of Lucern for five years, followed by a crop of wheat, all at the expense of 44,000 kilos. of farm-yard manure per hectare, put out on the land at the commencement of the period. These results were published by M. Crud, an eminent agriculturist.

Cultures.	Produce per hectare.	Contents in nitrogen
Lucern dry, 1st year	3,360 kilos.	79 kilos.
" 2d "	10,080 "	237 "
" 3d "	12,500 "	294 "
" 4th "	10,080 "	237 "
" 5th "	8,000 "	188 "
Wheat 6th "	1,580 "	31 "
Straw	3,976 "	12 "
Total nitrogen		1078
Manure employed contained of nitrogen		224 kilos.
Gain in nitrogen		8·4

Or for the five years of Lucern, 171 kilos. per year, as the wheat of the last year did not take any from the atmosphere.

Now as the residues of these green crops which remain in the soil, contain a corresponding quantity of nitrogen, they are the means of transferring to it such portions of that element as serve, if not fully to sustain its fertility, at least prevent the exhausting action of the white crops from being so soon or so severely felt. This is still more fully carried into effect when these crops, or the last growth of them, in place of being consumed, are plowed into the soil, where they act as the best form of manure, their fresh and juicy structure facilitating their decomposition, and their composition being such as to provide almost every element subsequently required.

The substitution of these plants as sources of food for the animals of the farm, for the common, or, as they are called, the natural grasses, has been one of the most important improvements in husbandry. The following table, which is collected from the best authorities, exhibits the quantity of actual nutritious material which is usually derived from an acre of land:

Crop.	Weight.	Starch and Sugar.	Gluten.	Oil.	Total.
Wheat	1500 lbs.	825 lbs.	185	45	1055
Oats	1700 "	850	230	95	1175
Peas	1600 "	800	380	45	1225
Potatoes	9 tons.	3427	604	45	4076
Turnips	20 "	4500	540	45	5040
Carrots	25 "	5600	1120	200	6920
Meadow hay....	1½ "	1360	240	120	1720
Clover hay.....	2 "	1800	420	180	2400

It is here seen that turnips and carrots yield from five to seven times the actual quantity of food that the corn crops give, also that potatoes and clover yield twice as much, and as it should be always the object of the farmer to do as much as possible in a given time, on a given space of ground, he should fix his attention on those systems of culture which thus produce the greatest quantity of food, and by the least exhaustion of the soil.

Practical experience bears out fully the principles I have here endeavored to explain. The Board of Agriculture in England directed special inquiries as to this point, and the result led to the general conclusion, that one year of tares, rape, potatoes, turnips, or cabbage, gives thrice as much food as one year of medium pasture grass. In his very useful Lectures on Agricultural Chemistry, Professor Johnstone adopts the same general proposition, but he couples it with some money estimates which I consider it important to notice. He says: "With the exception of rich pastures, it is said that land under clover or turnips will produce three times as much food for cattle as when under grass. If such a green crop, then, alternates with one of corn, the land should every two years (second year) produce as much food for stock as if it had been three years lying in grass, besides the crop of corn as food for man, and of straw for the production of manure." Professor Johnstone then proceeds to discuss the money value of the produce of similar pieces of ground under such crops, and concludes, that "Although more food is raised by converting the land to arable purposes, and more people may be sustained by it, yet more money would be made by meadowing the land, where a ready market exists for the hay, where it is allowed to be sold off the farm, and where abundance of manure can be obtained for the purpose of top-dressing the land every year." In order to arrive at this result he takes the price of produce as follows:

Hay, £5 ($25) per ton.
Turnips, 10s. ($2 50) per ton.
Barley, 4s. ($1) per bushel.
Wheat, 7s. ($1 75) per bushel.

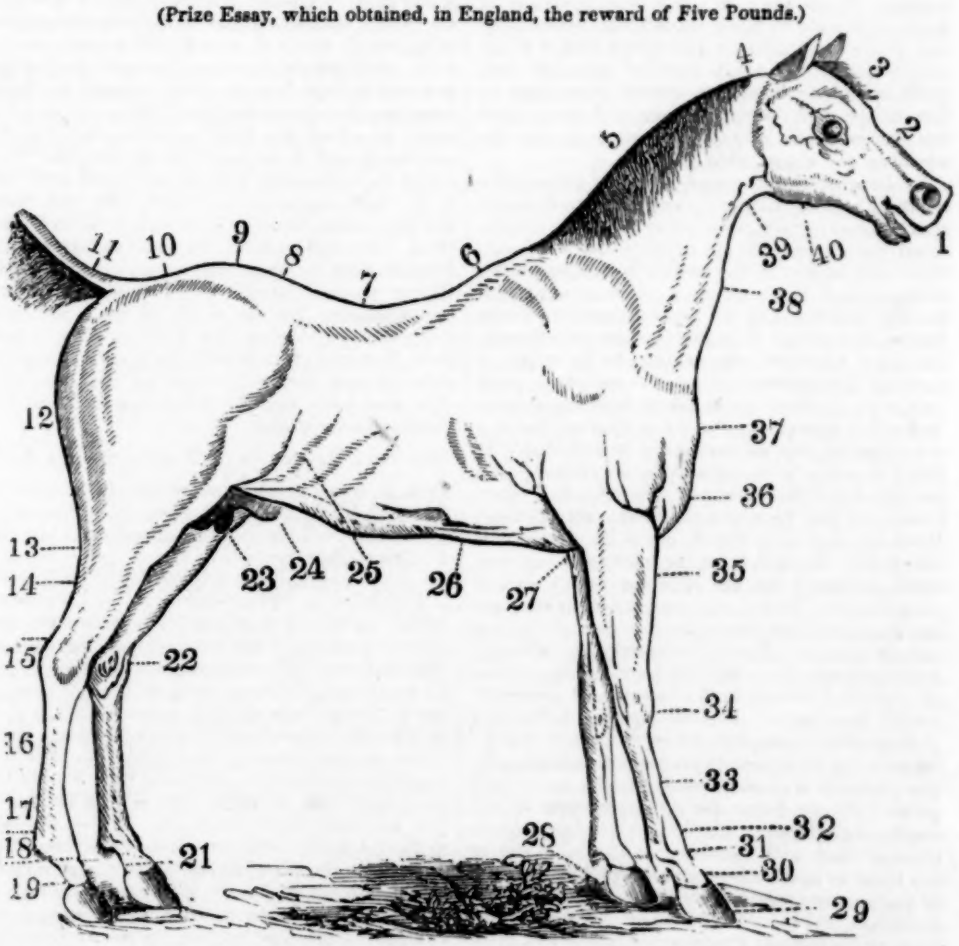
Such a price for the hay could certainly be obtained only in exceptional cases; the other circumstances he mentions could only be realized in some few localities, and there is no doubt but that, as a general principle in Agriculture, the cultivation of green crops and artificial grasses is not only that by which the largest quantity of food is raised, but also that by which the greatest money return is afforded to the farmer.

[The reader will bear in mind that while there are in this chapter facts and information of practical value, to be read profitably, he must not forget the difference in the cost of labor, which in England encourages the growth of hoed crops, and the difference in the greater moisture of the climate of that Island, which favors the production of grass throughout the year. In our country, the dearness of labor would go to encourage grazing in preference to cultivation where the country will admit of it; as in our Eastern States, and also in the South and West, where the mountain range, in summer, is connected with great fertility and abundant production of Indian corn in the adjacent country for winter use in fattening hogs and cattle. *Ed. Farm. Lib.*]

For the Hove in Cattle.—No better cure has yet been found than an egg-shell filled with tar. The second application seldom fails.

THE HORSE:

(Prize Essay, which obtained, in England, the reward of *Five Pounds.*)



TERMS COMMONLY MADE USE OF TO DENOTE THE EXTERNAL PARTS OF THE HORSE.

1. Muzzle.
2. Race.
3. Forehead.
4. Poll.
5. Crest.
6. Withers.
7. Back.
8. Loins.
9. Hip.
10. Croup.
11. Dock.
12. Quarter.
13. Thigh, or Gaskin.
14. Ham-string.
15. Point of the Hock.
16. Cannon.
17. Fetlock.
18. Large Pastern.
19. Small Pastern.
20. Hoof.
21. Coronet.
22. Ham, or Hock.
23. Stifles.
24. Sheath.
25. Flank.
26. Girth.
27. Elbow.
28. Heel.
29. Hoof.
30. Small Pastern.
31. Large Pastern.
32. Fetlock.
33. Cannon.
34. Knee.
35. Arm.
36. Breast, or Bosom.
37. Point of the Shoulder.
38. Windpipe.
39. Gullet.
40. Jowl.

AN ESSAY ON THE EXTERNAL FORMATION OR STRUCTURE OF THE HORSE, AND ON THE DISORDERS ORIGINATING THEREIN.

Plerique omnes faciunt adoles-centuli
Ut animum ad aliquod studium adjungant, aut ad equos
Alere, aut canes ad venandum, aut ad Philosophos.
TERENCE.

I PURPOSE, in the following pages, first, to give a succinct, but, I trust, useful and explicit description of the exterior conformation—the *make and shape* of that valuable animal the *Horse*; discriminating the *originally well formed tit* from the *cross-shaped*, and *likely-to-become-diseased brute*, and the *nag* that can go with safety and pleasantry on the road, or carry sixteen stone across a heavy country, from the *imbecile* and *weakly-constitutioned spider*; and, lastly, to show by what ready and certain modes we may detect unsoundness in the purchase of a *prad*, and *when* we are to pronounce that *he is perfectly sound.*

The HORSE, in the estimation of a sportsman, stands preëminent above other quadrupeds, as man does above every other animal: not only do matchless beauty and strength of form, combined with unrivaled speed, distinguish him, but the extensive utility he is of to us, and the share he takes in our diversions and perilous enterprises, serve to inspire us with even a de-

gree of affection for him. Every horse is adapted to some particular purpose; for horses not only differ in kind, but, like men, in utility, in temper, in stamina, &c., and the selection of them, in regard to these particulars, constitutes one of the most arduous and nicest duties of the *connaisseur*; he must readily acknowledge good or bad conformation—trace genealogy in the outline, and discover a *je ne sais quoi* about the *tout ensemble* that denotes good or bad instinctive and unalterable qualities.

In describing the good and bad points of a horse, it will be necessary to make use of many terms, denoting different external parts, which, to all *horsemen* will not require any explanation; lest, however, the reader be unacquainted with some of those terms, a plate is annexed, having references to the parts themselves in the figure of a horse. It requires some experience, but more attentive observation, to be what, in modern *horse-phraseology*, is called a *good judge*; i. e. (if we were asked to define a good judge,) to know, *at once, by a cast of the eye*, whether the nag, as soon as he is *pulled out*, is *likely to suit*: is he *cut out for a hackney*, or is he *calculated for harness*? Does he *look like a hunter*, or has he any *good looks* about him? Does he *show any blood*, or is he *all over a mongrel*? In fine, is he *the sort of thing* you want, or won't he do until he meets with a *greenhorn*? These, and various other important considerations we hope to unravel the nature of in the course of this inquiry, offering such remarks, from time to time, as may prove of practical service to the young and inexperienced horseman. At first sight of a horse, a *judge* takes a general survey of him, and if he observe any apparent disproportion or deformity, his attention is at once fixed to that particular point. Every horse, for example, that is tolerably well formed, should exhibit due proportions of limb and carcass; in fact, nine out of ten have as much carcass as is equal to the area of the space occupied by the legs in ordinary standing; but should his legs be extraordinarily long, or his carcass disproportionately small, he is said to have *too much daylight under him*, and that is certainly no mean objection. Should his head be very large, his neck of disproportionate length, his fore legs *stand under him*, or his quarters be *ragged* and ugly, such glaring imperfections cannot fail to attract our notice as soon as, or even before, the groom *has set him on his legs*. But we shall have occasion to particularize these things in a detail of the perfections and imperfections of the different parts entering into the composition of the animal.

The exterior of the horse may be divided, for the convenience of thus describing his several parts, into head, neck, body, and legs. First, we shall delineate a good head. The *nob* should be small. A large head is not only a *plain* head, but a bad point, inasmuch as it really, under certain circumstances, detracts from the powers of the horse; he has, in fact, more to carry—it is a burden to him, and the only way in which he can possibly carry it to advantage, is at the extremity of a short and upright neck. Like the weight of a pair of steelyards, if it is supported by a long and horizontal neck, its burden becomes enormously augmented, so that the weight transmitted to the fore extremities (for those parts support the head and neck as well as half the carcass) is much increased, and, from the natural preponderance of it before, is very likely to prove the cause of the horse's *falling down*, more especially if the rider is heavy, every trip or mis-step he may chance to make. In addition to all this, a *lawyer* (or big-headed horse) is apt to have a *hard mouth*, or rather, we say, *no mouth*, so that we are always apprehensive of his being *heavy in hand*, and *unpleasant to ride*. It is proper, however, to state, before we proceed farther, lest we incur censure for these remarks, that the formation of the neck, and *the mode in which the head is set on*, and *how he carries it*, will have much to do with the head being objectionable from its size, and with his being light or heavy in hand; for we have known many *big-headed horses ride well*, and be as *safe* and as *light in hand* as any others. Next to size, its shape becomes a consideration. Every *feature* should give animation to the countenance; let the forehead be *broad* and *flat*; the eye *staring* and *full of fire*; the ears *thin, fine*, and *often erect*; the nostrils *circular, dilated*, and *reddened within*; the lips *soft, thin*, and *hairless*; the jowl *extended*, and the cheeks *well marked*.

"Fire from his eyes, clouds from his nostrils, flow."

This, at least, is what we would have it in the thorough-bred, and as a general rule, the nearer that of any other description of horse approaches to it, the better the *family he springs from*, and the more sanguine we may be in our prognostic of his abilities. That such a horse *looks like a sticker*, or is a *perfect gentleman about his nob*, are no uncommon nor very unmeaning expressions in the mouths of *sportsmen* and *copers*. But his head may be very long, or it may be very short, though we do not know that either is particularly objectionable, except as an eye-sore, if the countenance is something like what we have just described; unless he be a *Yorkshireman*, and then, certainly, we should not fall in love with such a big *canister*. The *race* ought to be perfectly straight, (see plate,) and the *muzzle*, in the *blood horse, square*, and such as will *go into a pint pot*; a *Roman nose* (one in which the race is curved) is by no means desirable, though his *napper* be but of ordinary dimensions; it is seen more commonly, however, in a big head, which it, in a side view, makes appear not only much larger, but exceedingly ugly; this may be said to constitute a *plain Yorkshire head*. Withal, the head, to render it handsome, should be *well set on*; its junction with the neck should form a *sort of curve*, so as to leave ample space in the throat for a large and prominent *gullet*, by which we may judge him to be a *good-winded horse*.

The neck now demands our attention: if good, the crest will form an arch of agreeable curve from the *poll* to the *withers*,

"With neck like a rainbow, erecting his crest."

It will be of proportionate length, and progressive increase in breadth, as it approaches the chest. A *long* neck, if it be *straight*, or but *little curved*, is objectionable, for reasons we stated when speaking of a large head; a *short* one, however excellent it may be on the principle of the steelyards, is never *handsome* and seldom exists without rendering even a good hackney *piggish*. That *short-necked* horses are better winded than others, because the air has less distance to pass to and from the lungs, is an opinion to which we cannot subscribe. The neck should also be *thin*, not *thick* and *heavy*, and *rounded* and *straight along its lower margin*; should the *canal* of the *jugular vein* be

deep, and the windpipe *full* and *prominent* below it, we may regard it as a sign of *good wind*. When the arch of it is reversed, *i. e.* below instead of above, and the crest, or what ought to be the crest, near the withers, is hollow and sunken, the horse is said to have an *ewe-neck*, one of the greatest natural deformities common to these parts. Under these circumstances it is usual for a *dealer* to say that the neck is put on the wrong side upward; but, in reality, it appears to arise from the junction of it with the chest being too low down.

Of all the points of a horse, the shoulder, for a hackney, or a hunter, is of the utmost consequence: without a *good* shoulder, no horse *can ride well*; he may be a good *harness horse*, or he may *race* well; but it is physically impossible for him to carry his rider with ease and pleasure on the road. These are no speculative opinions, but facts, grounded on the experience of all men who *know a horse when they see one*, and the result of our own every-day observations—so much does the action of the fore extremities depend on the structure of this part. And now, what is it that constitutes a *good* shoulder, and how are we to know a *good* from a *bad* one? In order to render our answers to these questions intelligible, it will be necessary for us to deviate a little, and say something on the *internal* mechanism of the part. The *scapulæ*, or shoulder blades, are attached to the ribs by many powerful muscles, which move them, during the action of the animal, round their own axis, or, at least, in a very similar way; and though they can only revolve through the small segment of a circle, that segment is greater in proportion as they are more obliquely placed against the sides of the chest; hence it will be seen, that what is called an oblique shoulder is most advantageous for motion.—Again, the *best shouldered* horses have, generally, THIN withers; but this is not indispensably necessary to the formation of a good shoulder, for we know some, and *good judges*, who are of a contrary opinion. We must confess, however, for our own part, that we prefer *fine* withers. The *thickness* of the withers will depend on the conformation of the chest and the obliquity of the *scapulæ*, and not so much as some persons, high in veterinary repute, have supposed, on the length of the *dorsal spines*.* Now, if, in viewing the fore parts of a horse, we find he rises upon the withers, (and we must take care that this be not an illusion, produced by placing his fore legs upon rising ground,) and that no *traces* of his blade-bone can be seen under the skin, but all appears *smooth* and *level*, we may conclude that the shoulder is *oblique*; though a more direct proof is furnished us by carrying the eye from the summit of the withers to the extremity of the *point of the shoulders*. If it is upright, or nearly so, unless it be in a thorough-bred horse, (such a shoulder is only *fit for the collar*,) we shall perceive an irregularity under the skin, just below the withers, by passing our hand over the part, and find, on grasping the part, that it is *thick* and *clumsy*, because we are actually at the time grasping the *blade-bone* as well as *wither-bone*; though (as before observed) these may be *thick* from the construction of the chest.

A *lean* shoulder is one having *thin* withers, covered with *fine* and *genuine muscle*; a *loaded*, or *overloaded* shoulder, one with *thick* withers, clothed with *coarse* and *flabby* muscles; and the *thickness* of the wither, as was said before, depends on the obliquity of the *shoulder-blades*, and the proximity of their superior borders to the *dorsal spines*. That horses have been fast runners on the turf with *bad* shoulders, is no proof that they would not have galloped better and quicker with *good* ones; and we must recollect that in a racer the *hind quarters* are of primary importance, the *fore quarters* only of secondary consideration; but, on the road, we know that *bad-shouldered* horses are never *pleasant* nor *safe* hackneys; they *step short*, are *puddling walkers*, *roll about* in their *trot*, and are exceedingly likely to *go to prayers*.

The *fore-leg* should descend in a straight line from the bottom of their shoulder, *i. e.* in a lateral view; but when seen in front, it ought to incline gently inward. If the elbow projects directly backward, and the toe points with precision forward, we may rest satisfied that the horse is not *twisted in his fore legs*. Turning the toe *in* or *out* in standing is apt to be accompanied with distortion, or deformity of the limb This circumstance, therefore, is seldom seen without materially lessening the value of an animal. Of the two faults, turning them *out* is the greater, for the pointing *inward* is seldom carried to the extreme. A *good* arm is *broad* and *thick*, *long*, when compared to the leg, and marked exteriorly by *muscular prominences*. The elbow cannot *project too far back*, and the *plumper* the *muscle* is immediately above it, the greater we may conclude to be the animal's powers.

The *knees* ought to be *large*, *broad* in *front*, and distinctly marked with several *bony knobs*; *lateral thickness* is, also, of much importance. When the *radius*, (the bone of the arm,) instead of descending in a straight line, is directed backward, so that the knee appears to recede from it, the horse is said to be *calf-kneed*, a term that well conveys the idea we have of this formation: it is always objectionable for the *saddle*, but not for the *collar*. The leg should fall in exactly perpendicular from the carcass, and be *short* when compared with the arm, the converse of this being indicative of weakness; and of sufficient *breadth* to enable a purchaser, even at a distance, to distinguish the *tendons* and *bone*, with perfect clearness, in their relative situations; for, if he cannot do this, there is reason for suspecting that he is *gummy*, the effect of hard work or premature use, and never a *natural defect*. Should the legs be *round* and *straight* below, they are called *stilty*, and

* Bones of the withers. It is contended, on another side, that the *situation* of the scapulæ has nothing to do with the *thickness* of the shoulder, but that it is wholly owing to the *length of the spinous processes of the dorsal vertebræ*. To establish this opinion must be proved two data, viz: 1st, that these spines are short, or comparatively so, in all *thick-shouldered horses*, and long in *thin-shouldered* ones; and, 2dly, that the converse of this *never* happens. To *one who has dissected shoulders*, these are certainly *home-thrusts*; such, at least, as we could not parry; though we know that the dimensions of these bones may and do, like those of most others, vary in different horses. But they also vary in their degrees of inclination; and may not this circumstance alone, in some measure, affect the construction of it? At all events, we know these facts, dray or cart horses have *wide chests* and *thick shoulders*; others with *wide chests* have *thick shoulders*, but with *narrow chests thin*, unless the *scapulæ* be *upright*. Now, if they who differ with us, mean to assert that all this arises *solely* from the length of the *dorsal spines*, we can only say, *credat judæus appella*.

are never *firm* and *good*. But the best and only correct way to judge of legs, is to pass *the hand down them*; if they measure much round, and the sinews feel firm, hard, and distinct, like well-braced cords, and if the intervening spaces between bone and sinew be *clean—free from gum*—we may pronounce that they are *good*.

The *fetlock*, as a joint, should be of large dimensions, proportionate with other parts; no joint, in fact, is too large, providing its *bony prominences* be distinctly seen with the naked eye, and its *ligaments* perceptible under our fingers. I need not, therefore, farther enforce this truth in speaking of these organs. *Knuckling over* in the fetlocks is a sign of original malformation, such as *uprightness* in the pasterns, or else is the result of hard work; and the tottering affection of the limb, accompanying this state, is caused by local debility and excessive irritability in the nervous system. The pasterns always deserve much of our attention; when *good*, their *length* is proportionate with that of other parts, and they incline, with *much obliquity*, downward and forward to the foot, should they approach the *perpendicular*, they are almost always short, and are said to be *straight* or *upright*; but when they approximate to the *horizontal*, they are long, and called, though erroneously, *oblique*; for they are not so obliquely placed, under these circumstances, with regard to the leg, as they are when properly constructed. Perhaps no part of the horse exhibits the wisdom of Nature more, in regard to the adaptation of it, in point of structure, to the purpose for which the animal was designed, than this: in the racer, for example, the pasterns are *lengthy*, and incline to right angles with the legs, whereby more weight is imopsed upon the hinder parts of the fetlock and hoof, in which situations are placed *pieces of mechanism* which by their elasticity serve as so many springs in diminishing the effects of concussion so requisite in this animal, which was intended to perform *swift* and *sudden* movements; but in the cart-horse, whose action is *slow* and *powerful*, the pasterns are *short* and *nearly upright*, so that most of the weight is thrown upon the main bones of the foot, and thereby his springs, which have less play than those of the Arabian or thorough-bred, are not so much acted upon; consequently less provision is made against concussion, for strength, and not elasticity, is sought for in the construction of this powerful animal. Horses with very oblique pasterns are more likely to *break down*, and for this reason they ought never to be shod with thin-heeled shoes; on the other hand, if they are very short and upright in these joints, they are seldom or never sure-footed, and will soon become *stilty* and *groggy* from work.

The *hoof* next engages our notice, and this is a part of which we should be more than commonly scrupulous and nice in our inspection: "*No foot, no horse,*" is a trite but very true adage, and one that is not kept sufficiently in view by the purchasers of horses, or they would not have so frequently to *lament their hard fate* in having *gone to market for a screw*. First, we should look to the size of the hoof: a *small* foot is not only objectionable in itself, even though it be a natural formation, but is often a characteristic of disease; but a *small* and *upright* foot is a morbid structure, and is scarcely ever seen in any one but a *dancing-master*, or light-timbered tit. White hoofs are to be eyed with suspicion; they are really weaker, and more liable to disease than dark or black ones; and if a horse has one white and the other dark-colored, and he is lame, in nine cases out of ten it is the white foot that is affected. So much with regard to the exterior of the foot-before it is *taken up*. Other considerations now engross our attention. Is it contracted? *i. e.* is its circularity destroyed by narrowness at the heels? A *good* hoof is *circular* in the tread, or nearly so, measuring as much from side to side as from toe to heel; but we frequently find those that are morbid measuring as much from toe to heel as twice the lateral diameter. On the other hand, the *wall* of the *hoof*, which should, at all times, be perfectly *smooth* and free from ridges, (the contrary indicating disease,) may be very *oblique*, in which case it is not only *circular*, but *spreads out*, even to a morbid degree, in the tread. Large, heavy horses, such as are bred in low, marshy situations, are most subject to have this kind of foot, in which parts of the country it is preferred by many people, who contend that their hunters derive advantages from it. As the *strong* and *upright* foot is likely to become *contracted*, so is this subject to a disease called *fleshy soles*; indeed, in the former, the sole is concave; but in the latter it is flat, on which account the two require different modes of shoeing.

The *body*, or *carcass*, may be subdivided into the chest, belly, and loins. So far as regards the *constitution* of the horse, his *stamina*, or his *bottom*, no part is of more consequence than the chest; but, like that of many other parts, no particular construction of it is the best for all kinds of horses. That of the cart-horse should be *circular*, *broad in the bosom*, and *large in the girth*; that of the thorough-bred more circumscribed, but not *flat-sided*, very *deep*, and, also, extensive in the girth; so that the two differ more in *width* than in *depth*. Had the racer possessed a broad, circular chest, his shoulders must have been thick, and his fore legs far apart; and no horse so made can gallop well or fast, though many such are ridden as hackneys; they are apt to have a rolling gait, and an awkward mode of going altogether, perceptible at all times to the *connaisseur in horse-flesh*; but we must be careful, even in choosing racers, not to run into the other extreme; for, if *both legs come out of one hole*, or he be *flat-sided*, he cannot endure much fatigue, is very probably a *bad feeder*, and certainly predisposed to disease of the chest. A *full* and *prominent* bosom is a fine point; and the ribs should *stand out* with sufficient curve to afford space enough within; for which reason, some, as we before remarked, prefer a *thickish shoulder*, if it be an oblique one; and another advantage accompanying such conformation is, that *we have something between our legs* when mounted, a property, certainly, that every horse ought to possess. As to the belly, its shape will depend much on that of the chest and loins. A *narrow-carcassed* horse can never *do much work*, readily loses his condition, and with difficulty recovers it, being, very commonly, but a *queer feeder*. We should have *something to kick against*, and unless he *carries his dinner with him*, his *bread-basket* cannot be said to be of the best description.

The *back* should be perfectly *straight*; a *hollow* back is a sign of want of strength; but it is often extremely pleasant to the rider. A *roach-back*, the reverse of a hollow back, is by no means handsome, though some argue that horses having such are stronger; one objection to it is

that it is apt to chafe from the saddle. The loins are a point that we should always be nice about. A *hollow* back and a *narrow* loin are generally indicative of natural weakness; but the latter is far more exceptionable than the former: a horse so formed can seldom carry much weight, soon knocks up, and often proves a bad feeder: his constant *hollowness* in the flank, and his *lank* appearance altogether, after a day's hunting, demonstrate how incapable he is of bearing the exertions required of him.

The *tail*, in regard to the manner in which it is *set on*, is not to be overlooked: a horse that carries *two good ends* (of which the head forms one, and the tail the other,) always *looks grand—is a perfect gentleman in his appearance.* Above all others, the charger should possess this point in perfection, to coincide with the *grandeur of his carriage* in the ostentatious parade of a field-day. *Hinc bellator equus campo sese arduus infert.* The tail, in most horses, should form, when elevated, a straight line, or nearly so, with the back. A gentle declivity of the *croup*, however, from the summit of the rump, denotes the *blood-like quarter*, and adds much grace to this part in the thorough-bred: should this line decline very much, the horse is said to be *droop-arsed*, and the quarters lose much of their beauty as well as their natural power. Nothing is so ugly, in a *full-quartered horse*, as to see the tail set on low down, issuing abruptly from the rump as if a *broomstick had been stuck in the place.* The dealers who indiscriminately fig all, often *spoil the sale* of a horse of this description by *curling the tail upward with a dose of ginger.* Some horses *carry a good tail naturally*—others, by means of art having undergone the operation called *nicking*. *Gingery* or *peppery* hackneys seldom require *nicking*; indeed, hackneys are often called, from this circumstance, *cock-tails*, in contradistinction to *thorough-breds*, who seldom or never carry any but a *drooping tail*, better known by the name of *blood-tail*; a *cocked-tail* would be incompatible with a *blood-quarter*: hence it is that blood-horses should *never be figged*, or *nicked.*

The *quarters* may be *full*, *small*, or *fine and blood like. Full quarters* are such as are possessed by cart-horses, large machine-horses, and hackneys able to carry great weight. These horses are wide in the hips, though their hips are but indistinctly marked, in consequence of being enveloped by large, coarse, flabby muscles. People are too apt to regard *wide hips* as an objectionable point, from their giving to the horse that appearance called *ragged hips*, which, indeed, are not only ugly, but denote bad conformation, though, of themselves, they denote good make; for the fact is that *ragged hips* are produced by a *bad* loin, and a *lank*, *flat* and *weak* quarter. Were these parts well formed, we should pronounce the hips to be of the best description. The *small* quarter is one that is often seen in a horse of this form; though the general contour of it may be *regular* and *uniform*, it is altogether *disproportionately small* when compared with the carcass: if it grows narrow toward the hinder part, the animal is often said to be *goose-rumped.* But, of all other structures, the *blood-like* quarter is the best adapted for speed: in it the tail is *set on high up*, and the hips are high and prominent, but not *ragged*; so that many of our best racers are *higher behind than before* the *spaces* between them and the points of the quarters *great*, as are also those between the latter parts and the stifles; the haunches want the *plumpness* and *roundness* of the *full* quarter; but, so far from being either *lank* or *thin*, are *striped with bold and prominent muscles*, which, being free from the *adipose* and *cellular substance* that constitutes the *flabbiness* of those of the *full* quarter, are so distinct, even through the skin, that we can distinguish where one ends and another begins. The stifles should *project boldly forward*, and have a perceptible *irregularity* of surface. The thighs are *good*, when *long*, *thick* and *muscular*; little *hillocks*, or *rotundities*, upon them, mark the course of *muscles*, and always denote great power; the nearer the angles which they form with the parts above and below approach to *right angles*, the more force the *muscles* can exert; *ergo*, the more powerful the horse. The hock, of all other parts is in the racer of the utmost importance; it should be *broad*, *flat*, and of *large dimensions.* The propulsion of the machine is effected chiefly by those *muscles* that are attached to the point of the hock; so that the more *projecting* this is, the greater the force they can exert, simply on the principle of the lever: as a man with a long oar can row with more facility and effect than he who uses the short one, or *scull*, so can a horse with broad, projecting hocks *get over the ground* with comparative ease to himself, and pleasure to his rider. The advantages the *half-bred* horse with *good* hocks possesses as a hunter, are of no less moment than those a *good* hock confers upon the racer: his great propelling powers will enable him to *clear his raspers** with so much *grace* that the rider will find it a *difficult matter* to *pound him*,† and empowers him to *make such play* in the mud as will soon *sew up* his *lank-thighed* and *straight-hocked* competitors. The point of the hock cannot *stand out* too much; indeed, the greater its dimensions, altogether, the better, provided it be not *gummy*, or that its various *bony projections* and *sinewy parts* be distinctly seen or felt. If the hock is narrow, its point round, and not well defined, it is said to be *straight*, and, from being very liable to *curbs*, is often called a *curby-hock*: should its point be directed inward, and the toes turned outward, the horse is *cow-hocked*, or *cat-hammed.* As this is a part very liable to defect, as well as to original malformation, the nicest examination is required to detect all that may prove disadvantageous or injurious to its function, the proper performance of which is of so much importance that the propulsion of the whole machine depends chiefly upon it.

REMARKS ON THE PURCHASE OF A HORSE.—Having selected a horse whose *make and shape* please us, our next consideration is his soundness; for, though the horse-dealer may declare that he is as *sound as a bell*, we are to take the phrase as one having various meanings, and not be deterred from examining him, and narrowly, too, on that account. *Sight*, *wind*, and *limb*, must be the uppermost objects of inquiry; for nine hundred horses out of a thousand are defective in one of these particulars. First, then, examine his eyes, and do this before he comes out of the stable. Having placed him so that the light may fall upon the eyes but in one direction, see that they are of the same size, and equally full; that the haws are not prominent, and that one does not project more than the other; that the eyes are perfectly clear and

* *Rasper*, a high and dangerous leap.
† Surrounded by *inaccessible raspers.*

transparent; and that the pupils, or *apples of the eyes*, are exactly alike in size as well as color. A sunken eye, or one over which the lids are partly closed—a projecting haw—an opaque or semi-opaque front*—a pupil dilated, or a white or clouded one—are so many omens of disease, for which we should reject the *prad* as a *cupid*,† or, what is often worse, a *blinker*, who will shy at all he meets with, and break your neck the first *poser*‡ you ride him at. Having satisfied yourself in regard to his *peepers*, have him *pulled out*, and next proceed to examine his *pipes*. If *good* and *sound*, on being nipped in the gullet, he will utter such a sound as cannot fail to strike the ear as the emission of a good *pair of bellows;* but if his *lungs are touched*, and he is a *piper*, (that is, *broken-winded*, or *having no wind at all*,) he will give vent to a *dry, husky, short* cough. Should a horse be suspected of *bad wind*, however, the purchaser cannot do better than direct his attention to the flanks, which, under such circumstances, will work either much quicker than ordinarily, or heave deeply, and with great irregularity; they will be considerably longer in contracting themselves, in order to squeeze the wind out,‖ than in falling to let it in,§ which they do, if he is a *piper*, quite suddenly. But, though not a *piper*, he may be a *whistler*, or, what is worse, a *roarer:* the first may be known by the peculiar *wheezing* he is addicted to when put to sudden or long continued exertion; the latter, by *blowing his horn* clamorously under similar circumstances; and either may be made to display itself, by the purchaser giving him a smart cut, or even feigning to do so, with his *bit of ash*.

Thirdly, and lastly, as to the limbs. If, in passing our hand down his legs, we find any unnatural protuberance, or puffiness, or if, in feeling first one leg and then the other, we discover any difference between them, disease, more or less, is present; he may not be *lame*, but he is not *clean upon his legs*. *Splents, windgalls* and *ringbones* may be present without occasioning lameness, but they are all unnatural, are considered *blemishes*, and are all to be regarded with a suspicious eye, as either denoting past *hard work*, or betokening future evils. On the same principle, a horse may have a *spavin*, and be *only stiff* from it at *starting*, or he may have a *curb*, or a *thorough-pin*, and be *perfectly sound;* but these are still *blemishes*, and as such detract from the intrinsic value of the animal. In explaining the advantages resulting from *good* conformation, we are *naturally* led to make remarks *en passant*, on the disadvantages from *bad;* in pursuance whereof, I have shown *why* such a structure is *bad*, a question that *necessarily* entails upon us the mention of the *disorders originating therein*; *i. e.* the diseases to which such parts, in consequence of being *malformed*, are *predisposed*.

INOPES.

CULTIVATION OF THE VINE.

IF any exhibition of supineness on the part of American agriculturists could surprise us, it would be the neglect of so large a portion of them to provide, every man his own table at least, with an abundance of one of the most wholesome and delicious contained in the whole catalogue of fruits adapted to our climate, and of easy cultivation.

In the last September number we adverted to this subject, referring to the opinions and experience of Dr. Underhill, as of the highest authority, and gave at the same time an interesting letter from Mr. Mosher, of Ohio. With a view, however, to the interesting nature of the subject, and the necessity for fuller information on the part of those who would like to cultivate grapes on a scale at least adequate to the wants of their own family—and seeing, especially, that the time is at hand for the commencement of this beautiful and interesting department of Horticulture—we have pleasure in transferring, as we are allowed to do, what follows, from BROWNE's book on "*The Trees of America*," for which a gold medal was awarded by the American Institute. We are forced to stop, in this number, with what the author says of management during the first year. The residue, up to the "seventh year and subsequent treatment," will be given in our next, with engravings to illustrate the progress of its growth and management from year to year. The cut on the next page represents the Isabella (*Vitis labrusca Isabella*).

VARIETIES.—Several attempts have been made to classify the varieties of this species, but not with much success. In most cases, the form and color of the fruit alone have been considered, and in others the shape and clothing of the leaves; but, as it will be impossible for us to enter into all of these considerations, we shall only treat of a few of

* Transparent cornea. † A blind one. ‡ So called from *planting* all but the *nonpareils*.
‖ Expiration. § Inspiration.

those that have successfully been brought under cultivation, which are as follows:

1. V. L. ISABELLA, Prince. *Isabella Grape-vine.*—This variety is distinguished by its large, dark-purple fruit, of an oval form, and of a juicy, musky flavor. It possesses great vigor of growth, is a healthy and abundant bearer of fruit, and what renders it exceedingly valuable in our climate is, that it requires but little protection during winter.—Concerning its origin and history, we are indebted to General Joseph Swift, of Geneva, New-York, for the following account, which we trust will be no less acceptable in coming from so respectable a source, than in the interest elicited in so valuable a production. It appears that Gen. Smith, of Smithville, North Carolina, in 1808, procured from Dorchester, South Carolina, several roots and cuttings of a hybrid vine, which, it is said, had been originated there by some families of Huguenots, between the Burgundy grape of Europe, and the native Fox grape of that vicinity. In the year 1817, a vine produced from these cuttings was transplanted from Smithville, by Mrs. Isabella Gibbs, in honor of whom this variety was named, to the garden then owned by her husband, Col. George Gibbs, which was situated along the southerly side of Cranberry, between Willow and Columbia streets, in Brooklyn, New-York. In 1819, the garden was purchased by Gen. Swift, who very generously distributed roots and cuttings of this vine among his neighbors and others—more especially to the late Wm. Prince, of Flushing, Long Island; through whose efforts it became widely disseminated throughout the Union, and was sent to several countries in Europe, Madeira, &c. The garden has since been divided into lots, and occupied by buildings; and the original Isabella vine, after attaining a circumference of more than a foot, was severed to the ground in 1838. Fortunately, however, several vigorous vines have since sprung up from the roots, which continue to bear fruit in abundance. From other statements, it would seem that this variety is not a hybrid, but was known in this country prior to 1800.

2. V. L. BACOIS ALBIS, Loudon. *Bland's Pale-red Grape, Bland's Fox Grape, Bland's Virginia Grape, Red Scuppernong Grape, Carolina Grape, Mazzei Grape.*—This variety may be known by its pale-green leaves, lengthened clusters, with large berries, of a roundish or oblate form, pale-red color, and sweet, juicy pulp, of a pleasant flavor; in some cases, however, at full maturity, the fruit is said to acquire a dark-purple or red-wine color. It is more esteemed by some, as a table fruit, than that of the Isabella, having a thinner skin, and containing a pulp of less consistency. It was deemed for some time as unsuitable for our northern climate; but it has been found to succeed in maturing its fruit in most seasons, in the neighborhood of New-York, and may successfully be cultivated as a wall fruit in a much higher latitude, both in Europe and America. It has been contended that this variety was brought from Italy by Mazzei; but it is well known that it was cultivated by Col. Bland, of Virginia, long before that gentleman visited this country. The original vine is said to have been found on the Eastern Shore of Maryland, by Mr. Bland, who presented cuttings of it to the late Wm. Bartram and Samuel Powel, of Philadelphia, and some of the persons who received slips of it from the latter gentleman gave it the cognomen of *Powel Grape.*

3. V. L. CATAWBIENSIS. *Catawba Grape-vine.*—The fruit of this variety occurs in loose bunches, of an inconsiderable size, and of a beautiful appearance. The berries are large, and much varied in their flavor and color, according to their exposure to the rays of the sun. Those which receive the full effect of the sun are of a bluish-purple, and a slight musky flavor; but, when partially exposed, they are of a lilac hue, and those which grow entirely in the shade are of a translucent white, sweet, and devoid of musk in their taste. The fruit is earlier in ripening than that of the preceding variety, and, when allowed to remain on the vine until perfectly mature, the pulp nearly disappears. It is esteemed as a table grape, and has also been manufactured into an excellent wine. The original vine is said to have been procured from the banks of the Catawba, and planted in the garden of the late Mr. Schell, at Clarksburg, in Maryland, and has been known to bear nearly eight bushels of fruit in a single season.

4. V. L. ELSINBURGENSIS, Prince. *Elsanborough Grape-vine.*—This variety is noted for its sweet, juicy fruit, which is free from pulp, and musky taste. The clusters are of a medium size, with loose berries of a blue color, which are said to make an agreeable wine. Its foliage is of a pale-green, and resembles that of the wine-bearing grape of Europe, more, perhaps, than that of any other American variety. It somewhat resembles the Isabella in its bark and wood, but its fruit is thought to assimilate more nearly to that of the Meunier, of France. The original vine

was found and brought under cultivation by Dr. Hulings, in Elsanborough, in New-Jersey, where, undoubtedly, it was indigenous.

Soil and Situation.—The Isabella grape-vine flourishes best in a soil that is neither poor nor exceedingly rich, rather loose than compact, moderately moist, instead of being wet or very dry, and is free from an excess of salts, pernicious gases, and corruption; and in general, land recently cleared of wood is preferable to that which has been for some time under tillage. The situation should be chosen on moderately rising ground, rather than on that which is plain or abruptly steep, and the aspect should be inclined toward the south or east, sheltered both from the wind and intense heat of the sun, particularly during the latter half of the day, but not so much so as to impede a free circulation of air. The climate should be rather dry than moist, and warm instead of being cold. A doctrine advanced by various authors is, that the region of the maize and peach culture is also that of the wine-bearing grape of Europe. By parity of reason, the Isabella, and several other varieties, which are equally or more hardy than the European species, may be successfully cultivated from Mexico to those parts of America where the maize, or Indian corn, is to be considered a sure crop; that is, they will succeed along the shores of the Atlantic, in any parallel southward of the forty-third degree of latitude, and much farther to the northward, west of the Rocky Mountains.—The Isabella will also often prosper under circumstances considerably at variance with any of those above stated, but its fruit will not be of so fine a quality, nor so rich in its flavor.

Propagation and Management.—The Vitis labrusca Isabella, like all its congeners, may be propagated from seeds, by cuttings or layers, and by grafting or inoculation; but the mode almost universally adopted is by cuttings from the branches and roots. A simple, detailed account of the growth of a vine, from its separation from the parent stem to the period of perfecting its fruit, perhaps will convey the best idea of the process, and we will offer the following, as deduced from experience:

It was the opinion of L. Junius Moderatus Columella, a distinguished writer on husbandry, who flourished more than eighteen hundred years ago, and who owned an extensive vineyard in that part of Old Spain now called Arragon, that no kind of land whatever can be fruitful unless it be diligently, carefully and skillfully tilled, more especially when employed for vineyards. "For a vine," said he, "is a delicate, tender and weak thing, and can by no means bear with hard usage; and, for the most part, it is consumed by too much labor, and bearing too great a quantity of fruit; and, if you do not restrain it within due bounds, it perishes by its own fruitfulness.—But when it has, in some measure, strengthened and hardened itself, and attained, as it were, to the vigor of youth, it may prosper under neglect. But a young vineyard, while it is growing up, unless it receives due care and attention, will be reduced to the poorest and most starving condition, and will pine and waste away in such a manner that it can never afterward, by any experience whatsoever, be recovered and restored. Therefore, the foundations, as it were, must be laid with the greatest care; and, from the first day of planting, it must be managed like infants, with unceasing attention—which, unless we do, all our expenses will be laid out to no purpose, nor can the proper season of anything be recalled when once we let it pass." First, then, let us select a proper site of ground, and proceed at once and trench it to the full depth required. If it be situated on a plain, or in a valley, it should be dug two feet in depth, and on rising ground three; but on a hill-side, somewhat steeper, it should be turned up at least four feet, in order that the roots may penetrate beyond the reach of drouth. If the cuttings are intended to be planted in drills or rows, let there be formed trenches three feet in length, two feet in depth, and the width of a spade—leaving intervals or baulks, a yard in length, between the trenches, till the row is finished. Then, with good virgin soil, if it be at hand—if not, let it be procured from the woods—let us fill the trenches therewith, mixing it at the same time with a due proportion of leaf-mould or well-rotted manure, or, what is still better, the leaves and husks of vines, or grape-seeds, in order to quicken and strengthen the growth of the plants. If a vineyard be the object which we have in view, let the rows or drills be trenched from five to ten feet asunder, according to the surface of the ground and the latitude of the place. If the situation be on a plain, in a high degree of latitude, the rows should be eight or ten feet apart; but if it be on the side of a very steep hill, or in a low degree of latitude, five feet will be sufficient; and on moderately inclined surfaces, or in higher latitudes, six or eight feet apart will be all that is required. With regard to the direction of the rows, and the hight to which the vines should be trained, they may run in a manner that will allow them to face any point of the horizon between south and east; and they may be supported on props, or trellises from six to ten feet in hight, and even more, according to the vigor of the vines.—But in cities, and about houses in the country, single vines may be trained on the sides and ends of buildings, along the sides of fences, or on the trunks and branches of trees.

The most favorable season for planting the Isabella grape-vine in the United States is when the red-flowered maple is in bloom, which usually occurs in Georgia from the 20th to the last of February, and five or six weeks later near Philadelphia and New-York. In selecting the cuttings for a vineyard, they should be of one variety, and taken from the most fruitful part of the vine. Let us not con-

tent ourselves with single clusters, but those which are the most prolific. The greatest proportion of fruit grows from the buds on the last year's shoots next to the old wood, with the exception of the nearest eye the top buds being unfruitful and seldom bearing at all. Some prefer to plant cuttings containing a considerable portion of the old wood; but, as it is not always prudent nor economical to mutilate a favorite vine too much, it is best to select fruitful cuttings of the last year's growth, with the wood well ripened. They should be of a moderate size, short-jointed, and containing from six to eight eyes or buds in each. They should be cut off transversely from the vine, with a sharp knife, close to the old wood, and not less than two inches of blank wood should be left for the protection of the terminal buds. The ends of the cuttings that are to remain above the ground should be cut in an oblique direction, and the sloping side should be opposite the side containing the uppermost bud. If possible, they should be planted in calm weather, immediately after separation from the parent vine, and be obtained from a soil, situation and climate similar to those in which they are intended to grow; but, if any difference in these respects should unavoidably occur, it will be better to transplant from a poorer to a richer, and from a dryer to moister soil, as also from a colder to a warmer climate. But, should it be necessary to convey the cuttings from a distance, their lower ends should be immersed in a composition of fine earth, well mixed with linseed or other oil, of about the consistence of tar, as soon as they are cut off from the parent stock; at the same time taking the precaution not to cut off the top ends till the moment they are to be used.

Management during the First Year.—The ground having been prepared in the manner above described, the cuttings are next to be planted in the centers of the trenches, so that each terminal bud will be even with the surface, and directed toward the south. Then the earth must be firmly pressed round each plant, and, should it subsequently settle and leave more than one bud above the ground, more earth or mould must be added to bury them up.

As soon as the season becomes hot and dry, it will be necessary to protect the cuttings from the mid-day sun, by means of matting or other materials, which should be removed toward evening, and allow them to remain uncovered until the next morning, at about the time of the disappearance of the dew.—Strict attention must now be observed in keeping the soil around the cuttings continually moist, and, should not this be effected by natural means, it must be done by sprinkling rain or river water over them, or, what is still better, soap-suds, or other stimulating fluids, specially prepared for the purpose, but not too strong. Soon after the cuttings begin to take root, which may be known by the swelling of the buds above the surface, young shoots will gradually protrude, and the plants will require but little attention during the remainder of the season, except an occasional hoeing, to destroy the weeds, and to loosen the soil in order to admit the air and moisture about the roots. Should the season prove dry, however, and the earth around the plants become parched, it will be necessary to irrigate them frequently with rain or river water, or with prepared liquids as suggested above. Early in autumn, rub off all the buds from each plant, except two, which are to be reserved for training the ensuing year.

The method of managing the vine from the first to the sixth year, as practiced by Mr. B. E. Valentine, of Philadelphia, and published in Hoffy's "Orchardist's Companion," for 1841, is the same as that recommended by Clement Hoare, a highly esteemed writer on the cultivation of the vine, and whose mode, with a slight variation for climate or seasons, is believed to be best adapted for this species of culture of any practiced in the United States. "On the first of December, or as long as the weather remains open," says he, "the soil round the roots should not be covered over; but, as soon as frost comes, a good covering of litter or well-rotted manure must be laid over the ground, as far as the roots extend; and, if the weather be very severe, it will be better also to cover over the stem to the depth of five or six inches above the top of it. The young plant, being thus well protected from the severity of the winter, may remain in this state till the first of March.

☞ S. B.'s last, in which he courteously takes leave of X. Y. Z., was received too late for this number. We are glad to see them part without any signs of that animosity which intellectual controversy too often engenders in minds less liberal and expanded. We should still farther rejoice to have them open and work some of the rich veins in practical Agriculture which have not yet been exhausted or explored.

Best Water for Plants.—It is well known that rain water is much better than spring water for promoting the growth of plants: this is owing to the former containing ammonia, and which is abundant in liquid manure. Pounded carbonate of ammonia mixed with water will quickly show the efficacy, when sprinkled on grass.

LETTER III.

ADAPTATION OF THE SOILS, HERBAGE, &c. OF THE SOUTHERN STATES TO SHEEP HUSBANDRY. 1. OF THE LOW OR TIDE-WATER REGION.

Natural Features of the Southern States—Divided into three Zones...The Natural Features, Soils, &c. of each...The Tide-water Zone—Its destitution of Artificial Pastures and Meadows...Causes—Small amount of Domestic Stock kept—Unsuccessful Experiments in raising Clover and Grasses...Reasons why those Experiments were unsuccessful—Land too much Exhausted by Severe Tillage—System of Tillage compared with that of the Grazing Regions of New-York—Experiments unsuccessful, also, because improper varieties of Clover and Grass were tried...Much of the Land adapted to Grass—Shown by its Natural Pastures—Statements of Col. Allston—Opinions of Mr. Ruffin—of a Committee of the S. C. Agricultural Society...Land compared with that of Flanders—also with some parts of New-York...Climate perhaps unfavorable to certain Northern Grasses and to Red Clover—Opinion of Mr. Ruffin—Statements of Milton (S. C.) Agricultural Society...Clover not indispensable...Experiments suggested...Valuable indigenous and acclimated Grasses—Crab Grass—Millet—Bermuda Grass—its great value—Statements of Mr. Affleck... Peas—Their great value in the Southern States as a Green Crop Manure—Sprengel's Analysis of them—The Value of their Straw as a Manure compared with various substances—Table of the Value of Manures by Payen and Boussingault...Oats, Rye and Barley—Corn Blades—Sweet Potatoes...Conclusions from foregoing.

Dear Sir: Having discussed, in my previous letters, the effects of warm climates and some of their incidents, on the health of sheep, and on the quantity and quality of their wool, we come now to the second branch of my original inquiry—Is there anything in the natural features, soils, herbage, &c. of the Southern States, which unfits them for a natural and easy adaptation to sheep husbandry?

The vast region south of the Ohio and Potomac, and west of the Mississippi—comprising an area considerably exceeding that of France, Spain and Portugal*—is distinguished, by its natural features, into three distinct zones, parallel to each other and to the Atlantic coast.

The lower or tide-water zone, which skirts the Atlantic, is a low, flat, sandy, and oftentimes marshy plain, from 50 to 100 miles wide, comparatively recent (tertiary) in its formation, and covered with pine forests over the greatest portion of its extent. The soils on the dry lands are generally light, and sometimes too sterile to admit of profitable cultivation; that in the swamps and river bottoms, where the sand is replaced by a rich alluvion, is exceedingly fertile. The middle or hilly zone rises from the level of the preceding, first into gentle hills, and finally into high and oftentimes broken ground, as it approaches the mountains. The width of this does not greatly vary from that of the preceding. The formation is almost exclusively primary;† and the soil varies, sometimes being poor, but more generally ranging, in its natural state, from medium to highly fertile. The forests consist of oak and other deciduous trees. The third or mountain region is formed by the different chains and groups of the great Apalachian range of mountains, and occupies not far from 70,000 square miles of the central portion of the territory under consideration.‡ It comprises the middle of Virginia, the west of North Carolina and South Carolina, the north of Georgia and Alabama, and the east of Tennessee and Kentucky. Its formation on the eastern declivities of the Blue Ridge (the most eastern chain) is primary, and thence to the Alleganies the rocks belong to

* Spain contains 170,000 square miles, Portugal 40,000, France 200,000—in all 410,000. Allowing 10,000 square miles of Louisiana to be east of the Mississippi, the area of the region referred to is 456,000 square miles.

† There are one or two interrupted belts of *new red sandstone*—vide McClure.

‡ Estimated not far, I think, from correctly, by myself. I can find no authority on this point.

the Transition order.* Its soil varies from thin and light to that of exuberant fertility. West of the mountains, the hilly zone rests on Transition rocks and coal measures, and is succeeded west and south of Virginia by the vast rolling or level plains which extend to the Ohio and Mississippi; and which, instead of the silicious sands of the eastern coast, exhibit rich and varying soils resting on limestone and other Transition rocks. In Virginia, the hilly region, which is one vast coal measure, extends to the bottom lands of the Ohio; and its soils, taken as a whole, range from ordinary to meager.†

We will now proceed to examine the capabilities and adaptation of each zone, separately, for the purposes of sheep husbandry. It has already been shown that sheep are healthy, and produce as heavy, and *may be made* to produce as fine fleeces as elsewhere, in the tide-water zone. They are easily kept—finding, in a climate so mild, considerable succulent food even in the winter; and, south of North Carolina, large numbers would subsist during the entire winter on the hardier wild herbage which continues green in the forests and swamps. If this region was stocked with sheep, to the extent alone to which they could find subsistence, summer and winter, on wild herbage—or, in other words, get a living without costing their owners anything—the present number would be largely increased, and their wool and mutton would add materially to the annual income of the owners of the soil. But a better system would undoubtedly be not to depend upon wild herbage alone, but to have pastures or sheep-walks seeded with the best grasses which will flourish on them, and provision made for a quantity of dry fodder, or some substitute for it, for winter use.

Can this summer and winter feed be produced, in the region under examination, to any considerable extent, at an expense which would render its conversion into wool and mutton profitable? There are patches of good natural pasture in many parts of the tide-water zone, apart from the salt or fresh water marshes. But artificial pastures and meadows have rarely been attempted. The planters in this portion of South Carolina, for example, actually import hay! "Many of the cotton and rice planters . . . in some cases buy hay from New-England. . . . Northern and (in some cases) European hay is even carried up to supply Augusta and Columbia, along rivers which flow through swamps covered with natural grass, so rank and luxuriant as to be almost impenetrable."‡

This neglect of grass culture springs from several causes. Little farm-stock, comparatively speaking, is reared or kept by the rice and cotton-planters, from the fact that most of the labor on such plantations is performed by men; and the few animals kept are fed on wild herbage, or the offal of crops which are raised for other purposes. The carriage and draught horses and mules are fed in the winter on the leaves or "blades" of corn; and the neat stock get their living in the swamps, and in the corn fields, where the greatest portion of the stalks are usually left standing.

Nor is it to be denied that various unsuccessful experiments have been made in the cultivation of the grasses and clover, which have discouraged farther efforts, and led many to infer that the soil or climate, or both, are decidedly uncongenial to them. That the soil or climate is as favorable to the production of rich, thick swarded pastures or meadows, as in many

* So termed by Werner. Though little used now by geologists, I resort to it as the shortest descriptive epithet which will include all these rocks, unless it be the Hemilisyan of Brongniart, the Submedial of Conybeare, or the Graywacke of De la Beche—neither of which is so familiar, nor, it appears to me, any better. The Transition rocks are equivalent to both the Cambrian of Prof. Sedgwick, and the Silurian of Mr. Murchison—whose nomenclature is adopted by Lyell, Phillips, Mantell, &c.

† Dr. Morse, Mitchell, &c.

‡ Ruffin's Agricultural Survey of South Carolina, 1843, p. 73

parts of the Northern States, I do not contend. Some of these soils are doubtless, naturally too barren to be made to produce good yields of grass, without an expenditure which would more than counterbalance the profits accruing from them. Others have been sunk nearly to the same level by wasting and improvident tillage; and it is on lands of the latter class, mainly, that the experiments in introducing the grasses and clover have been made. As long as they would produce cotton or corn, these crops were annually taken from them, with perhaps an occasional year of rest (i. e. lying without any crop being sown on or taken from them); and, when reduced to such a degree of barrenness that the crop fell short of repaying the cost of producing it, clover or grass was resorted to in the vain hope of suddenly repairing, through their instrumentality, the ravage and desolation of years. The following is from the report of a Committee of the Fishing Creek Agricultural Society, Chester District, South Carolina, made to the President of the State Society in 1843; and, though this district is not in the tide-water zone, the system of cropping described is more or less the prevailing one* throughout much of the cotton growing region:

"We generally plant cotton on fresh land four or five years in succession—then corn—then wheat or oats—again corn and cotton; and, after it will produce little else, we sow it in rye, and let it rest two or three years. There are no fixed principles observed in the rotation of crops. . . . We have no data whereby to fix the expense of cultivation accurately. We know this, however, that at the price of produce for the last two or three years, we are sinking money."†

I ask what would be expected, in the way of grass or clover, from some of the best grazing lands of New-York, after being cropped with grain crops from ten to twelve years consecutively, with little or no manure?—However carefully seeded with the best grasses, or with clover, they would not form meadows worth mowing, nor pastures where an acre would summer a sheep—though, as now managed, an acre is poorly grassed that will not summer five or six sheep. Take the map of New-York, Sir, and draw a right line from Buffalo to a point a little south of Albany—say Coxsackie—and all the region, speaking in general terms, south of this line and west of the Catskill Mountains, is mainly devoted to grazing. It is the best grazing region of the State, and much of it is equal to any in the Northern States. The best farmers in no part of it take off to exceed three grain or root crops before seeding down to grass; and, unless the soil is unusually rich, it is customary to give barn-yard manure to one of these crops. This is almost invariably the case where the land was in meadow when broken up. Where no manure is given on meadow lands, or even on lightish pasture lands, two grain crops are considered sufficient by the most provident farmers—it being an axiom among such, that all ordinary or thinnish soils should be nearly or quite as rich when seeded down as when broken up. In other words, they draw from the soil only what is equivalent to the strength or fertilizing properties of the sod, and of the manure given.—When seeded down to grass, these lands are usually depastured by cattle or sheep several years before they are again broken up. If converted into meadow, they are top-dressed from time to time with gypsum, and sometimes with stable manures.‡ The poorest soils, rocky hill-sides, declivities much subject to washing and gullying, are rarely broken up after being once properly seeded down. I repeat it, Sir—take all the grazing lands of New-York, and crop them as severely as it is reported above to be done in Chester District, South Carolina, and they would become so sterile that,

* *Id est*, so far as constant cropping without returning anything to the soil is concerned.
† See Ruffin's Agricultural Survey of South Carolina, 1843—Appendix, p. 6.
‡ It is not considered good economy, however, to top-dress any meadows with stable manures which are dry and arable, and can thus be subjected to the regular rotations of the farm.

unless resuscitated by copious applications of manure, they would not yield grass enough to pay the expense of keeping them under fence, until they had lain waste for a quarter of a century.

Another cause of the failures which have attended some of the efforts to introduce the culture of clover and the grasses on the tide-water zone, in the Southern States, may, and probably has, existed in the improper selection of the varieties sown. As the first crop on a very meager soil—red clover, for example—is not appropriate in any region. In Flanders, the natural soils of much of which so closely resemble those of the zone under examination, it is not sown until the land is enriched and got in condition by several preparatory crops.* The different grasses seem to be affected by various conditions in the soil or atmosphere, or both, which it is frequently difficult or impossible to detect. Timothy grass *(Phleum pratense)* is decidedly the favorite meadow grass of the grazing regions of New-York. White clover *(Trifolium repens)* invariably comes up spontaneously on those lands. Red clover *(T. pratense)* is sometimes sown with Timothy in meadows, and generally in pastures. Red Top* *(Agrostis (stricta) vulgaris)* is preferred on wet lands, where it comes up spontaneously. It is considered a prime pasture and meadow grass in such situations. June or Spear grass *(Poa pratensis)*, the Blue grass of the South ern and Western States, so prized there and also in England,† is considered an unprofitable intruder in our meadows, where it comes up spontaneously, and ultimately drives out the Timothy. The meadows are then said to be "run out," and are broken up. I have never known the seed of this grass sown in a single instance! The favorite Rye grasses of England *(Lolium perenne var. bienne)*, Lucern *(Medicago sativa)*, Sainfoin *(Hedysarum onibrichis)*, Orchard grass *(Dactylis glomerata)*, and various others equally celebrated in England and on the Continent, have been tried in New-York, and the experiments are generally regarded as decided failures. None of them, at all events, have obtained a footing among the grasses sown by our best farmers. On the other hand, the Red Top of New-York is but little regarded in England,‡ and Timothy was not in much better repute until the Woburn experiments demonstrated its great value for hay. Even now it is considered inferior, in general value, to many other grasses.‖ All this goes to show that even the hardiest grasses have their favorite situations; and that we are not authorized to pronounce against the practicability of forming pastures and meadows in a given region, because we have failed in a trial with two or three grasses, out of a list of as many hundreds.

It has already been remarked that there are patches of good natural pasture on the dry as well as the wet portions of the tide-water zone. These are frequent and extensive, and could be rendered infinitely more so by simply clearing the land. In your Memoir on the Cultivation of Rice, furnished to Mr. Ruffin, while making the Agricultural Survey of South Carolina, in 1843, you say:

"At first, rice was cultivated on the high land, and on little spots of low ground, as they were met with here and there. These low grounds being found to agree better with the plant, the inland swamps were cleared for the purpose of extending the culture. In the process of time, as the fields became too grassy and stubborn, they were abandoned for new clearings; and so on, until at length was discovered the superior adaptation of the tide-lands, and the great facilities for irrigation afforded by their location. For these, the inland plantations were gradually and slowly abandoned, until now, that the great body of land, which

* Sometimes known as "Upright Bent grass," and in the Southern States as Herds-grass.
† Pronounced by Sole the best of all the grasses.
‡ *Agrostis vulgaris* is pronounced "a worthless or rather a mischievous plant," by Sir George Sinclair!
‖ "Our opinion," says Loudon, "is that neither Timothy nor (some other grasses named) is ever likely to be cultivated in Britain."

little more than a century ago furnished for exportation over 50,000 barrels of rice, now lies utterly waste, constituting, where trees have not overgrown it, the finest natural pasture which could be desired."*

Mr. Ruffin in his Report of the Survey, of the same year, asserts:

"Few countries possess greater natural facilities, or which are more improvable by industry, for producing in abundance, grass, hay and live-stock, and their products of meat, milk and butter, all of which are now so deplorably deficient."†

The Committee appointed by the State Agricultural Society of South Carolina to take into consideration the scheme of reducing the quantity of cotton grown,‡ in their Report observe:

"Millions of acres in South Carolina, including the lower country, are admirably adapted to the raising of rich grasses. This might be added as another branch of industry, from which reasonable profits could be realized, and might very well be added to the cotton planter's income."

Corresponding statements, on equally indisputable authority, might be indefinitely multiplied, not only in relation to that portion of the tide-water zone lying within the limits of South Carolina, but in all the Southern States. South Carolina occupying a central geographical and latitudinal position, in reference to this zone, and its soils on it, about averaging, so far as I can learn, with that of the other States, it is not necessary to pursue the inquiry.

Where fine natural pastures spring up spontaneously on deserted lands, more or less impoverished—probably in most instances considerably so—how little difficulty would there be in forming, almost immediately, the best artificial pastures and meadows on millions of acres of just such land, (only that it is in its virgin state, and consequently far better,) now in unproductive forest! And how small would be the amount of skill requisite to convert millions of acres more of cotton lands—which do not now yield *remunerating* crops—into pastures and meadows, which, as I shall show, would yield their owners a handsome remuneration!

And the culture of the grasses need not stop with these comparatively good and medium lands. They can be made to stretch their carpet of green over the poorest of your sands—over those now covered with stunted pines, or which, scorched and naked, reverberate back fiercely the burning heat of a southern sky.

There are few regions in the tide-water zone possessing poorer soils than some *cultivated* portions of New-York. In the vicinity of Albany, (between that city and Schenectady, for example,) the same loose, silicious sands, the same, though perhaps rather more stunted, growth of pines, would almost compel you to fancy yourself somewhere between Richmond and Wilmington, on the route of the great Southern Railroad! Denuded of their meager covering of dwarf pines, and the cohesion produced by their interlacing roots, these sands would be lifted and driven about by the winds. Yet on such a soil as this, you find the farm of the late celebrated Jesse Buel! And fertile grass fields, dotted here and there with splendid mansions, are every year stretching out farther and farther among the arid sands. How are these rapid transformations in the fertility of the soil accomplished? The stables, and mews, and cesspools of Albany can give the answer!

The following description of the natural soils of Flanders, now proverbial for its fine crops and rich pastures and meadows, is from the pen of that able English agricultural writer, Rev. W. L. Rham:

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* Agricultural Survey of South Carolina, 1843. Appendix, p. 14. † Ib. p. 73.

‡ The Committee consisted of Whitemarsh B. Seabrook, Esq., John B. O'Neall, Esq., and W. J. Allston Esq.—and the Report was made, I believe, in January, in 1846.

"The greater part of the land in Flanders is naturally poor; and in extensive districts, which now have the appearance of the greatest richness at harvest time, the original soil was once little better than the blowing sands which are met with in the neighborhood of the sea. Neither is it a genial climate which brings forward the fruits of the earth in abundance; for the climate is inferior to that of France or the southern parts of Germany. The soil may be divided into two classes. The first consists of the alluvial clay loams near the coast; the second, of various sands and light loams which are found in the interior. The most fertile is that of the low lands which have been reclaimed from the sea by embankments; it is chiefly composed of a muddy deposit mixed with fragments of marine shells and fine sea sand . . . . In the interior of East and West Flanders the soil varies considerably; but the principal part is of a sandy nature. The sand, and a heavier loam which scarcely deserves the name of clay, are found much intermixed, which is owing to an alternation of layers of sand and loam, which are found by digging to a considerable depth. These layers are not of great thickness, and the accidental circumstance of the washing away of the sand in some places and the depositions from rivers in others easily account for this variety. Some of the elevations, which are nowhere considerable, consist of a very poor sand, and suggest the idea of their having once been the sands of the sea blown into hills, as is observable on the coast. These hills, if they may be so called, are naturally so barren that they were, not very long since, covered with heath, or at best planted with fir trees; but they have gradually been cultivated and improved, and only a few remain in their original state of heath and wood. The poorer sands have been brought into cultivation chiefly by the persevering industry of small proprietors and occupiers."

Have we not here a good general description of much of our southern Atlantic coast—the tide swamp and sandy plain—and even a graphically minute account of the "Sand Hill" region of South Carolina?

Instances of the reclamation of such lands might be indefinitely multiplied.

I do not offer the above facts to prove that it is either profitable or expedient to reclaim all the sterile lands of the southern sea-board by the same means that have been resorted to about Albany, or in Flanders. Except in the vicinity of cities, where manures are plentiful and cheap, and uncommon market facilities are offered, it would not be profitable, unless it can be accomplished by less expensive means.

But it proves one and an important position: that it is the sterility of such soils—or perhaps their loose and "blowing" character in some places, their sun-baked hardness in others—which prevents them from spontaneously producing esculent herbage; and nothing in them, as has been frequently fancied, positively deleterious to vegetation. And it follows, hence, that whenever it is *profitable* to convert them into grass lands, it is *practicable* so to do by the proper application of manures. But do I hear some of your South Carolina neighbors, of the anti-improvement school, (if you have any such,) say, "If our *soils* are, or can be made, generally, suitable for the production of the grasses, our *climate* cannot?" This position is obviously incorrect, as warmer climates, as, for example, Australia, the Cape of Good Hope, and various others, produce, where the soils are favorable, a luxuriant growth of grasses; and South Carolina herself, as has been already shown, produces them bountifully in situations where neither the latitude nor the elevation abates one jot of the heat of your fervid climate.

It is not impossible that the climate of the States farthest south—south, say, of North Carolina—may be unfavorable to certain grasses and clovers; and perhaps so to the favorite ones of the Northern States. In relation to red clover, however, the acclimation of which is regarded by many as so important to those States, it seems Mr. Ruffin thought otherwise. He says:

"Perennial, or other permanent grasses, of which, doubtless, there may be found some peculiarly suited to the warm climate, (South Carolina,) would still more serve to give the great benefits of changed condition to the fields, independent of the much needed benefits of grass husbandry for feeding of live-stock and giving rest and manure to the land. The grasses whose value has been fully established by long experience in more northern coun-

tries, should be tried—not because they are from the North, (which in itself is a strong objection,) but merely because their good qualities are known, and possibly some such grasses may as well suit a more southern clime. And such, I trust, is red clover, the best of all green and manuring crops. For although this was long held to belong to the North only, I have fully experienced that its locality and the perfection of its growth *are fixed much more by peculiarity of soil than by latitude*. Not more than twenty years ago it was as general a belief in *Lower* Virginia, as now in South Carolina, that there the soil was too scanty and the sun too hot to raise red clover. But since marling and liming have made many of these soils calcareous, it is found that neither the sandy soil nor hot and dry climate forbid the raising excellent and profitable crops of clover. And so hereafter it will be found in South Carolina."*

In a Report by a Committee of the Milton Agricultural Society, (embracing adjacent parts of Laurens and Newberry Districts, S. C.) made to the State Society in 1843, they state:

"Our native grasses, except the crab grass, are of the poorest kind, principally sedge. Of the artificial grasses, some trials have been made with red clover and herds-grass.† On rich lots the first appears to succeed very well. For alternating with tillage crops we do not know of its having been tried; but our impression is, that without manuring more highly than is customary here, it will not answer. We are not aware that it has ever been sowed with gypsum. The herds-grass, as far as it has been tried, appears to succeed very well on the bottoms that border our branches and creeks."‡

Lawrence and Newberry are not in the tide-water region, but so far as the effect of climate alone is concerned, their testimony has an equal bearing.

I have little doubt that red clover may be cultivated on good, rich soils even in the States south of North Carolina, and may possibly become, under some circumstances, a profitable crop in their rotations; but, as has been already remarked, it will not do as a *first* crop on very meager soils, in any climate—and still less so, I apprehend, on such soils south of latitude 34°. It is not, therefore, the crop which you need, to *cheaply* ameliorate your poor and exhausted soils, to fit them either for grazing or for tillage. Grant that such soils can be fitted to produce it, as Mr. Ruffin suggests, by the application of lime or marl,‖ these manures will be found expensive, can be but slowly obtained in quantities sufficient to apply to large tracts, and, besides, when the soil is sufficiently ameliorated to carry clover, it will carry most if not all of your ordinary tillage crops. Though clover would aid materially in the rotation, in *sustaining* or even improving the fertility superinduced by lime or any other fertilizer, it is not, and cannot be made the *original* fertilizer on the sterile sands of warm climates. When we talk, therefore, of the initiatory steps by which such soils shall be brought from a state of barrenness to a state of production, clover does not come within the category of appropriate agents.

Though red clover ranks in the first class, if not the first in that class, on appropriate soils, as a grazing and manuring crop, I have never regarded it as indispensable—as what the *lawyers* would style a *sine qua non*—even in *sustaining* fertility anywhere except on rich calcareous wheat lands, where a severe and exhausting rotation is resorted to. Where wheat is taken from the soil *at least* every alternate year, for ten, fifteen, or twenty years, without any manure, excepting the intervening crop, and the droppings of animals depastured on it, clover will *better* sustain the land in the ultimately fatal struggle, than perhaps any other green ma-

* Ruffin's Agricultural Survey of S. C., 1843, p. 81.

† This should be the *Agrostis stricta* or *vulgaris*—the Red Top of the North. Some writers designate it as the one species, some as the other.

‡ Ruffin's Agricultural Survey of S. C., 1843; Appendix, p. 9.

‖ Unless, however, the soil contains more *organic* matter than I suppose to be the case with many of your *sandy* soils, theory and practice both show that lime will not prove the proper manure. Though exceedingly valuable in its place, experience shows that it is no agricultural *panacea*. I shall allude to this subject more fully in a subsequent letter.

nuring crop. But on the silicious grazing soils of Southern New-York, it is rarely used exclusively as a manuring crop, and is but little used, excepting slightly admixed with timothy, for pasture or meadows.* I think it should be used more; but the fact stated shows that clover is not regarded by practical men, who are perfectly familiar with it, as that indispensable crop, in all situations, which some of its more extravagant panegyrists would lead us to suppose. The conclusions which I would have you deduce from the above facts and statements are, simply, that if clover is found to flourish with you without extra trouble and expense, you will do well to make use of it in your rotation; if not, it is chimerical, in my judgment, to engage in an expensive struggle with natural disadvantages to force its cultivation.

The herds-grass (red top) spoken of by the Milton Society, is a good grass on moist (but not boggy) soils, and having been found to succeed with you, is worthy of trial in such situations, but on dry soils, especially on arid sands, it would entirely fail. Nor have I much confidence in either timothy or spear (blue) grass, in such situations, in your latitude—none at all in the former.

It would be well, probably, to try limited experiments with all grasses, domestic and foreign, which have succeeded well on *soils similar to your own;* as among these, some may be found which disregard climate, or are even better fitted to your climate than their indigenous one, as was the case with timothy at the North. The same remark is also true in relation to certain other esculents which are used as substitutes for the grasses, and for green manuring crops.†

Notwithstanding the evident propriety of such experiments, I am strongly inclined to the opinion that it is to your own native grasses and esculents, or those of some kindred climate, you must look mainly for the basis of your grazing husbandry—and through this, the amelioration of your poor and exhausted soils.

I regret that I can find no list of those native grasses which sward over the deserted lands of the tide-water zone, and flourish with a tropical luxuriance in its swamps. You allude to them as 'native" grasses, so does Mr. Ruffin. Mr. Seabrook, in his Report on Cotton Culture,‡ speaks of "crop grass," by which I suppose he means Crab grass, *(Panicum sanguinale,)* coming up spontaneously after spring-sown peas; but farther than this, neither of you specify varieties.‖ Among these indigenous ones, particularly those which spontaneously make their appearance on dry lands, it would be exceedingly singular if there are not several very valuable grasses *for your soils and climate*—grasses the seeds of which should form a part, if not suitable for the whole sowing, on the same kinds of soils on which they are found flourishing.

Crab grass grows in all parts of the southern States, and is a fair, though not a *very* superior pasture and meadow grass.

Golden millet *(Panicum milliaceum)* is a great producer and withstands

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* I know of but very few farmers excepting myself, in this, (Cortland,) one of the best of the grazing counties, who sow unmixed clover seed. I confess myself decidedly partial to the crop. You may ride ten miles or more in many directions from my house, where half and frequently more than three-fourths of the fields are in pasture or meadow, without observing five acres of unmixed clover.

† See Appendix, A.

‡ For this elaborate and exceedingly able Report or Memoir, see Farmers' Library, 1845, October, November and December Nos.

‖ Since writing the above, I have received from a South Carolina correspondent the following list of grasses and other esculents which flourish in the lower part of that State. Crab grass *(Digitaria sanguinalis)*, earlier—the "Crowfoot" *(Eleusine Indica)*, a little later, are, he says, the best grasses for hay, and thrive in cultivated grounds from the month of June till frost. The "Wild Okra" *(Viola palmata)*, the "Partridge Berry" *(Mitchella repens)*, the Wild Pea Vine, and several other esculents, obscure and unknown by name, flourish in most natural pastures from early spring till November.

a warm climate, but it requires a good soil. It has been cultivated with great success by Mr. Affleck in (Adams county) Mississippi.

Bermuda grass* *(Cynodon dactylon)* I have been led to consider, from the representations of Mr. Affleck, as the best grass, both for pasture and meadow, on the sterile sands of the tide-water zone. If half this enthusiastic admirer believes of it is true, it is of inestimable value to the South, and for *permanent* pastures and meadows, is by far the best grass in the United States. Mr. A. says:

"We are fully aware of all the objections made to the spreading of this grass, and have a practical knowledge of all the trouble it occasions; and having also had several years' experience of its great, its incalculable value, we have no hesitation in stating that the latter is manifold greater than the former. The time is not far distant when all the rough feed consumed on plantations will be made from this grass; and when the planter will consider his hay crop as of much more importance than his sugar or cotton. . . . . The excellence of this plant for pasturage is evinced by two circumstances. It is preferred by stock of every description to all other grass, and it grows luxuriantly in every kind of soil. It possesses an additional advantage, that of binding the loosest and most barren sandy tracts. But when it has once taken possession of close, rich soil, its extirpation is so difficult as almost to defy all the skill, industry and perseverance of farmers. It is used to bind the levees on the banks of the Mississippi, and of railroads. We saw it at Macon, Geo., Charleston, S. C., and so on, as far north as City Point, Virginia, where it partially covers the wharf. One hundred pounds of grass afford *upward of fifty of dry hay;* and *we do cut*, as a regular crop, five tons of hay per acre each season. Were we to state *how much more* has been cut, we might strain the belief of our readers. No other grass will yield such an amount of valuable hay; surpass it in nutritive qualities; support on an acre of pasture such a quantity of stock; will improve the soil more quickly; or so effectually stop and fill up a wash or gully. But, on the other hand, its *extirpation*, when once well established, is almost impossible; though to check and weaken it, so far as to grow a grain or cotton crop, is easy enough. To do this, pursue the course of the best farmers of Kentucky in their management of a blue-grass sod—with a good breaking plow, having a wheel and coulter, and a stout team, turn over evenly and nicely a sod four inches thick and as wide as the plow and team are capable of, follow in the same furrow with another plow which casts the dirt well, and throw out as much of the fresh earth on top of the sod as possible or the depth of the soil will admit of. The crop that follows can easily be tended without disturbing the sod, and its gradual decay will greatly increase whatever crop may be planted on it—and that should be a shading one, corn and peas or pumpkins, or winter oats followed by peas. Good farmers will understand that heavy crops of hay cannot be removed, for many successive years, from any land, without some return in the shape of manure. To the careful, judicious farmer, who wishes to improve his land and his stock, and who does not expect to grow any crop without trouble, and who uses good plows, and keeps a stout team and that in prime order, we earnestly recommend to try an acre or two of this grass, in a situation where it cannot readily spread. To the careless farmer we say, touch it not."†

The same gentleman writes me under date of Dec. 10th, 1846:

"Bermuda grass well set, which affords the finest and most nutritious pasturage I have ever seen, will keep almost any number of sheep to the acre—three or four times as many as the best blue-grass!"

Unless this is gross and willful exaggeration,‡ here you have a grass which is not only highly palatable and nutritive, but which will yield more than double both of pasturage and hay, than the best grass or clover of the Northern States!‖ It has been tried as far south as New-Orleans, and the climate found no detriment to it. It will flourish on dry and almost barren sands.§ What can the farmer on the dry lands of the tide-water zone ask more? Its inextirpable character I regard as decidedly in

* Cumberland Grass—Wire grass of Virginia—Creeping Panic grass.

† See Norman's Southern Agricultural Almanac, for 1847.

‡ Neither of which are we permitted to suspect, from the well-known character and intelligence of Mr. Affleck.

‖ People here in the North sometimes *talk* of getting three tons of timothy and four tons of clover (at two cuttings) per acre, but it is not done on one acre in ten thousand, on the best meadows! Two tons is a good, and by far above a medium yield, of timothy, and three, of clover. The large amounts of Bermuda sometimes cut, which Mr. A. does not mention for fear of "straining the belief of his readers," he has stated to me personally, to be *eight tons!!*—equivalent to the yield of *three* first-rate acres of timothy on the best grazing lands of Southern New-York.

§ Mr. Affleck informs me he has repeatedly seen it growing well in such situations.

its favor on millions and millions on the thinner and poorer soils of that zone—as once admitted, it will put an end to the unprofitable tillage practiced on them, and remove all temptation to resort to it on others, as they are gradually rescued from barrenness. It will thus compel the adoption of that pastoral system which can alone make these lands profitable, or save them, if the forebodings of those who have been reared on them and are deeply attached to them, can be credited, from ultimate desertion.*

You have another fodder crop—and which may be made a green manuring one, in no respect inferior to clover. The pea is to the South what clover is to the North.† There is something in your soil or climate, or both, which seems to be specifically adapted to the development of this plant—for it flourishes with you under a much greater variety of soils and circumstances than at the North. A leguminous plant, like clover, it draws much of its aliment from the atmosphere; and it is perhaps as sensibly affected by the same cheap manure, plaster. Its haulm or straw, if cut and cured greenish, and well taken care of, makes a good, rich fodder relished by all kinds of stock. Peas are greedily eaten by neat stock, swine, and sheep, for which they form a healthy and highly nutritious food. The white field pea of the North is considered equivalent to our corn,‡ by measure, in fattening swine. For sheep, and particularly for breeding ewes, there is probably no feed in the world equal to nicely cured pea haulm,‖ with a portion of the seed left unthreshed.§ It gives them condition and vigor—and prepares them to yield a bountiful supply of rich milk to their young.

Though the pea is an annual, it becomes in effect a perennial, South, when it is desired, by suffering it to stand until some of the grain shells out.¶ It will mature in a southern climate, sown late in the summer, so that one, and even two preceding crops of it might first be plowed in as a manure. It will ripen among Indian corn, sown after that plant has ceased to grow, and there have been successful experiments of sowing it late with wheat, oats, &c., to have it obtain its growth (to be plowed under as manure) after those crops have been harvested.

Sprengel gives the following analysis of the pea. 1,000 parts in the common dry state yield–

	Seed.	*Straw.*		*Seed.*	*Straw.*
Potash and soda	15·50	2·35	Sulphuric acid	0·52	3·35
Lime and magnesia	1·95	30·70	Chlorine	·38	0·00
Phosphoric acid	1·90	2·40	Silica, iron, &c.	4·40	10·85

* Statements of this kind have been repeatedly made in the pages of the Monthly Farmer by southern gentlemen.

† I had labored under the impression that the so-called *pea*—cultivated as a manuring crop in the Southern States, was in reality a variety of the *bean*; but Mr. Ruffin in his Agricultural Survey of South Carolina, (see Report of 1843, p 81,) and Hon. W. B. Seabrook in his Memoir on Cotton Culture, (see Monthly Journal of Agriculture, Dec., 1845, p. 287,) speaks of this crop—the former again and again—as *peas*, without the qualification which would be expected from gentlemen of so much learning, in case they were speaking of a plant by a vulgar misnomer, instead of its real name. The peculiar value of the crop at the South in the particulars described, I find asserted by Mr. Ruffin, Mr. Affleck, and various other writers and Agricultural Societies, *in the strongest terms*, and therefore it makes little difference, practically, whether the name is correct or not, but if not, the following analyses, &c., are misplaced. The bean resembles the pea in its qualities and value, but is rather inferior to it. See Appendix, B.

‡ The small, hard corn of the North contains more nutriment per bushel than the large southern corn.

‖ That is, cut and cured so that it will come out of the stock or mow bright, and with the leaves looking green—instead of having the ferruginous hue of over-ripe clover.

§ If cut greenish and well cured, the greener pods will not thresh out readily, and then they are in exactly the proper condition for breeding-ewes. If the crop is very light, cut it when all the pods are quite green, and feed it out without threshing.

¶ This is, however, poor economy in any case. If the objec is peas, it is wasteful to the crop, and the quantity sown is uncertain; besides, the haulm is ruined for fodder. If the object is manure, the loss is still greater. Plants in drying lose the nitrogen contained in their sap, give up their saline matters, and are "resolved more or less completely into carbonic acid, which escapes into the air, and is so far lost."—See Liebig on this subject, and also the clear and able remarks of Johnston, (Johnston's Agricultural Chemistry, vol. ii. p. 176, *et supra.*)

The following table of the comparative value of manures, deduced from analyses made by Payen and Boussingault, will show the remarkable comparative value of the pea as a manuring crop, and it will be found otherwise useful for reference:

TABLE No. 4.

Kinds of Manure.	*Water per 100.*	*Nitrogen in 100 of matter.*		*Quality according to state.*		*Equivalent according to state.*		*Remarks.*
		Dry.	Wet.	Dry.	Wet.	Dry.	Wet	
Farm-yard dung	79·3	1·95	0·41	100	100	100	100	Average of Bechelbronn.
Dung water	99·6	1·54	0·06	72	2	127	68	Washed by the rain.
Wheat straw	19·3	0·30	0·24	15	60	650	167	Fresh of Alsace, 1838.
Rye straw	12·2	0·20	0·17	10	42·5	975	235	Of Alsace.
Oat straw	21·0	0·36	0·28	18	70	542	143	do.
Barley straw	11·0	0·26	0·23	13	57·5	750	174	do.
Wheat chaff	7·6	0·94	0·85	48	212·5	207	47	do.
Pea straw	8·5	1·95	1·79	100	447·5	100	22	do.
Millet straw	19·0	0·96	0·78	49	195	203	51	do.
Buckwheat straw	11·6	0·54	0·48	27	120	361	83	do.
Dried potato tops	12·9	0·43	0·37	22	92·5	453	108	
With'd l'ves of beet-root	88·9	4·50	0·50	230	125	43	80	Of mangel-wurzel.
Do. of potatoes	76·0	2·30	0·55	117	137·5	85	73	Withered top and leaves.
Do. of carrots	70·9	2·94	0·85	150	212·5	66	47	
Do. of heather	7·0	1·90	1·74	97	425	103	23	Dried in the air.
Do. of oak	25·0	1·57	1·18	80	293	125	34	Leaves fallen in autumn.
Do. of poplar	51·1	1·17	0·54	66	134	167	74	do.
Do. of beech	39·3	1·91	1·18	78	294	102	34	do.
Clover roots	9·7	1·77	1·61	90	402·5	110	25	Dried in the air.
Burned sea-weed	3·8	0·40	0·38	20	95	488	105	
Oyster shells	17·9	0·40	0·32	20	80	488	125	
Sea shells		0·05	0·05	3	13	3750	769	Dried sea-shells of Dunkirk
Sea-side marl	1·0	0·52	0·51	26	128	377	78	
Solid cow-dung	85·9	2·30	0·32	117	80	84	125	
Urine of cows	83·3	3·80	0·44	194	110	51	91	
Solid horse-dung	75·3	2·21	0·55	113	137·5	88	73	
Horse urine	79·1	12·50	2·61	641	652·5	15¼	15¼	The horse drank but little, the urine was thick.
Pig dung	81·4	3·37	0·63	172	157·5	58	63	
Sheep dung	63·0	2·99	1·11	153	277·5	65	36	
Pigeon dung	9·6	9·02	8·30	462	2075	21¼	5	Of Bechelbronn.
Guano	19·6	6·20	5·00	323	1247	31¼	80	Imp. into Eng. in its ord. state.
Do.	11·3	15·73	13·95	807	3487	12½	28¼	Imp. into France, do.
Fresh bones	30·0		5·31		1326		7½	As sold by the melters.
Feathers	12·9	17·61	15·34	903	3835	11	2⅔	
Woolen rags	11·3	20·26	17·98	1039	4495	9¼	2¼	
Horn shavings	9·0	15·78	14·36	809	3590	12½	3	
Coal soot	15·6	1·59	1·35	81	337·5	122	30	
Wood soot	5·6	1·31	1·15	67	287·5	149	35	
Picardy ashes	9·2	0·71	0·65	36	162·5	275	62	

It will be seen that pea straw is worth, as a manure, from 5 to 9 times as much as the straws of the small grains—is better than clover roots, and actually equals farm-yard dung!

Rye, oats and barley send up a good growth of straw, in many parts of this zone, even where the product of grain is small; and, sown in the fall, they afford sweet green pasturage, during the entire winter, in the more southern latitudes. This is a very important and a very favorable consideration in an economical system of sheep husbandry. All winter green feed (roots) in the Northern States must be cultivated, harvested, protected from the frosts of winter in cellars, and daily fed out—which necessarily renders it expensive. Where winter field crops can be depastured on the ground, it saves the greatest proportion of this expense; and, though winter green feed is not indispensable to sheep, it promotes their health, early maturity, and is especially valuable to breeding-ewes. All the crops above named, too, can be profitably made use of as green manure.

Blades of corn, well cured, are relished by sheep, and they thrive on them.*

The sweet potato is also readily eaten by them, and it fattens them perhaps as rapidly as any other root crop. Although it might be regarded as too valuable for sheep feed, in regions where the whole force is given to the culture of cotton, there are others where, I cannot but believe, it might be occasionally if not regularly resorted to with profit, unless rye, oats, barley, &c. can be provided so much more cheaply that it is no object so to do. It is so cheaply planted by slips, and tilled with so little trouble, and it so admirably prepares land for subsequent crops,† that, on rich and otherwise favorable soils, my impression is strong it is, at all events, as cheap a winter feed for stock in the South as the Irish potato is in the North. Its average yield is about two-thirds that of the latter. The Irish potato is universally regarded as one of the cheapest feeds that can be given to all kinds of stock, to which it is adapted in the North. It is true that it is not fed so much as it would otherwise be, with us, in the winter, by reason of the *cold*. It is difficult to protect this root from freezing, and at the same time leave it accessible for daily feeding, without putting it in dwelling-house cellars, which are usually at some distance from the feeding barns and yards; and besides, the conversion of this citadel of a northern matron's culinary stores, into a great, dirty root pit, would be a most grievous infringement on all the canons of good housewifery!

The foregoing facts show that the Southern States have already all that is necessary to feed stock and fertilize their fields. Their pea, take it all in all, is a full equivalent for the clover of the North.‡ By means of it—of Bermuda and some other grasses—aided by the droppings of sheep, and other cheap and convenient manures, a large proportion of the tide-water zone, now so unproductive, can be converted into grazing lands, which will yield as good a per centage on present capital and investment as the best cotton uplands, and produce wool *at a less expense per pound than any region of the United States north of the Potomac.*‖

FISH-PONDS.

THEIR CONDUCTION AND USEFULNESS.

THE utter indifference displayed by a vast majority of our farmers and planters to those means which tend to embellish and render attractive their homes, and add to the innocent enjoyment of their families, is inconceivable. How few are there supplied with an *abundance* of the finest fruit! And yet, what is the cost? A few hours in budding (as simple a process as any in Agriculture), and a little labor. They are all willing enough to rob a "bee tree," and that at the cost of five times the labor it would require to make a few boxes to hive and domesticate the bees in. They have all heard of, and know, or ought to know, the sim-

* A friend of mine wintered a few Merino sheep on not only the blades, but the *stalks*, of our northern corn, chopping the whole up together, and adding a little bran or shorts. He found it cheap feed, and the sheep got fat enough to slaughter before spring.

† After the crop is harvested, swine are turned in, and they root the ground over so deeply and thoroughly that it is in a better state of tillage than could be produced by mere spring plowing.

‡ Mr. Ruffin, the great advocate for clover, admits that in the South it is not fitted to precede Indian corn, on account of the destructive *cut worms* it harbors, unless the land be plowed "early in winter," or other precautionary steps are taken. The pea is not liable to this objection. See Ruffin's Ag. Survey of S. C., 1843, p. 78.

‖ See Appendix, C.

ple process of caponizing fowls; yet they are contented to sit down to a scrawney, stringy, skinny chicken, instead of a fat, tender, luscious capon. He who dwells far inland may serve upon his table as fine fish as he who lives upon tide-water; but it would require some enterprise and a little trouble—so he sticks to his hog and hominy to-day, hominy and hog to-morrow, from year's end to year's end.

Of fish and fish-ponds it is our intention here to treat.

In Europe the fact is notorious that both the dove-cote and poultry-yard are far behind the fish-pond, both in the quality and quantity of their products, though far more expensive.

The first mention of fish-ponds in history is among the Romans; their invention is attributed to Murena. Those of Cato the ancient were immense, and the fish were regularly fed and fattened for consumption. We have an account of the ponds of Hortensius, of Lucullus and Cæsar, but they were on a scale that required to form them the wealth of the most powerful men in a nation that had seized the riches of the world. Lucullus severed a mountain that he might conduct an arm of the sea to his reservoirs; hence (as Pliny tells us) the great Pompey called him the Roman Xerxes.

A species of fish called the Lamprey was, it appears, held in the highest esteem for its delicacy. History has transmitted to us the name of Vedino Pollio, who had the hideous fantasy to feed his large lampreys on living slaves.

Fish were tamed and came at the call of their feeders. The orator Hortensius shed tears at the death of one of his lampreys, and his heiress Antonia decked a favorite fish of hers in gold rings, and it became an object of great curiosity in the neighborhood.

They had, too, their ponds for oysters, that were brought from immense distances. But enough of this that is merely curious, and let us turn to the practical.

The pond should, if possible, be near a spring, and thence derive its supply of water; those upon larger streams are liable to be swept away by freshets. The lot in which the pond is situated should be kept permanently in grass; otherwise the water at every rain is liable to become muddy, and the pond to fill up from the washing of the soil. To construct the dam, commence by sinking a ditch (until you reach the solid subsoil) four feet wide, and in the center of the place to be occupied by the dam; the earth thrown out to be laid on each side. This ditch is to be gradually filled with clay, a little at a time, and that to be kept moist and well pounded. This wall (as it were) of clay to be carried quite to the top of the dam, and will form what is called the key. The dam should always be three times as wide at the base as it is high, and its width at top should equal its hight. The more gentle the slope from the top of the dam each way, the greater its strength. Trees and shrubs should never be planted upon it, as the decay of their roots is liable to let the water through. The stream running from the pond might in many locations be turned to good account, either as water-power for the minor domestic purposes, such as forcing water, churning, &c., or for irrigation.

In Europe their fish-ponds are usually stocked with the carp, tench and pike, but we have a fish that is worth them all, and that is the James River or North Carolina *chub*. We find it hard to say how we like him best—fighting gamely for his life (as he always does) at the end of a line, or smoking on the board with "sauce and fixins *a la Guy*." Your old Baltimore friend, unexcelled if not unequaled in his profession. How could he be otherwise, growing up under the eye of your other old friend, KING DAVID?

Now that the land is webbed over with railroads, there can be but little difficulty in getting this noble fish anywhere. Doctor Thornton, of Rappahannock, Virginia, ranks it next to the salmon. He has succeeded perfectly in transporting them alive over eighty miles of bad road, at the speed of ordinary road-wagons. There is no fish that will thrive better; even in small ponds they sometimes attain 15 pounds in weight; and though last, not least, young Wade Hampton, (than whom there is no better authority) says it 's a crack sporting fish! F. G. S.

LECTURES ON BOTANY

AS CONNECTED WITH AGRICULTURE.

WHO can read the following without being again powerfully impressed with the necessity of such a reform in our systems of rural education as shall insure the youth of the country, who are to live by the labor and products of the country, being early instructed, not in a senseless repetition of speeches by Greek and Roman orators and generals, as—"My voice is still for war," &c.—but in branches of knowledge that will *open to them the beauties of their own pursuit*, and lead them to see that it cannot be followed with the highest profit or honor without a better insight into the sciences that serve to enlighten the practice of it.

Does any one undertake to manage and direct all the complicated operations of a large manufactory, without having served an apprenticeship to the business and learning its mysteries? And yet is it not obvious that Agriculture, too, is nothing but a manufacture? For the manufacturer's business is so to manage and combine and bring into coöperation his soil, seed, manure, labor, and various materials, as that out of them he may most economically supply himself with other products more desirable, as beef, butter, cheese, cotton, sugar, rice, corn, wheat, &c. What, then, but a great manufactory on a large scale, and requiring rare tact and high qualities in conducting it, is such an estate, for instance, as Hopeton, near Darien, Georgia, which employs not less than $30,000 worth of machinery, in its various operations?

How gratifying to see Governor Aiken, and all other Governors in the country, calling the attention of Legislatures to provision for *school instruction* in the *sciences* applicable to Agriculture! The truth is, that there is no guaranty in anything but that for permanent, sure, wide-spread, respectable, and progressive improvement in this greatest, because most useful of all arts. But we have not time to indulge in the reflections that rush upon the mind, with deeper and deeper convictions of its importance, whenever we begin to write or think on this matter. Our present purpose was merely to submit the following to the mind of the reader, and to ask respectfully of every father whether he ought not to feel the same obligation to have his son instructed in these branches of useful as well as elegant knowledge, so directly allied to his calling that he would do to have his leg well set if fractured by a fall from a horse. A crooked leg is unseemly, to be sure, but the father of true sensibility will regard in his son a crooked or empty mind as a much more lamentable deformity. But, thank Heaven! the ball is in motion. See Doctor Thomson's letter, and a thousand other auspicious signs.

COURSE OF LECTURES ON BOTANY IN REFERENCE TO AGRICULTURE.

By CHARLES JOHNSON, Esq., *Professor of Botany at Guy's Hospital, &c. &c. At Messrs. Nesbit's Agricultural and Scientific Training School, Kennington Lane, Lambeth, near London.*

INTRODUCTORY LECTURE.

WE commence this day a series of Lectures on Botany, not as an abstract science, but as one intimately connected with various branches of human economy, and more especially with that which, as it ever has been, so it must continue to be, of the utmost importance to mankind, viz., *the cultivation of the earth, the prime source of our civilization and of almost every art that ministers to the elevation and improvement of Society.* Itself an art of the highest antiquity, Agriculture must al-

ways have been one of progression; more or less simple in its practice at the first, observation and experience season after season suggesting new plans of operation, new means of improving or maintaining the fertility of the soil, and of guarding against those casualties that in every country and climate affect the productiveness of the crop. The success —sometimes, perhaps, rather fancied than real—of one experiment led to the institution of others, and thus the pursuits of the husbandman, originally followed without rule, and precarious in their results, were by degrees brought to a state of perfection and fixity of purpose that elevated the art to the science, the mere laborer to the philosopher. Such has been its progress in all ages among all nations. But to advance beyond a certain point, the cultivator of the earth must extend his sphere of information. must seek the aid of other sciences, possibly of those which, from imperfect acquaintance with their objects, he has hitherto regarded as completely isolated from his own. So mutually dependent are the laws and operations of Nature upon each other, such her unity of action, that to confine ourselves to any branch of knowledge abstractedly is folly, willful blindness: learn all you can, and you will not keep it seven years without turning it to some useful purpose. We are advancing in our estimation of these things daily; and you whom I now address will stride, I trust, not one, but many steps, beyond your fathers in the great work of improvement, whatever may be the duties of your after life. A high-class farmer of the past generation would have ridiculed the idea of his son and intended successor being taught at school the rudiments of chemistry and natural philosophy: they might, indeed, be very useful to a manufacturer, but quite superfluous in his case. As to Botany, he would regard it as downright nonsense. Not thirty years back, I knew a gentleman, residing in one of the best cultivated districts in England, who had the reputation among his poorer neighbors and dependents of dabbling in magic, and among those of his own grade, even the best informed, was looked upon with a sort of pity as a monomaniac—simply because, being a man of some scientific acquirements, he was laboring by rational means to enhance the value of his own property, and suggest improvements to those around him; had written a book on the natural history of his native county, employed his leisure from other pursuits in analyzing, in a small, well-furnished laboratory, the subsoil of his own and his neighbors' fields; occasionally cultivated patches of all sorts of weeds, exotic and British grasses, &c., with a view to the best means of exterminating the former and ascertaining the value of the latter, in a plot of ground set apart for the purpose; and, more wonderful than all, sought to discourage poaching by turning away his gamekeeper and neglecting his preserves. The prejudices against new methods of cultivation are now quickly subsiding, in proportion to the diffusion of general knowledge; the numerous Agricultural and Horticultural Societies that have successively started into existence in this country, the increasing numbers of their members, and interesting character of their meetings, all evince that a spirit of inquiry is extending its influence among our rural population, no less than among our manufacturers and merchants, the results of which it is at present difficult to speculate upon, but the general cry is, "Forward, forward." In Great Britain every movement of the kind has been hitherto due to the energy of private individuals and the ready response of an industrious and enterprising people; but on the Continent—in France, Prussia, and most of the German States—public schools, under the auspices of the Governments, and established by them, are open for the education of youth in this important department of human economy, furnished with professors in the auxiliary branches of science, as chemistry, botany, geology, &c., and with all the essentials requisite for combining theory with practice. The advantages already derived to the States in question from these establishments have been sufficient to prove the value of the extended system of education they have afforded; and old prejudices are universally disappearing as their pupils become distributed through the Provinces, carrying with them the most unbiased views and openness to conviction which are the natural results of a liberal course of instruction.

The value of Botany, as a practical science, is not so well appreciated in this country as it is abroad; and this simply because the attention of our practical men has not been hitherto sufficiently directed to it, nay, has even been averted in consequence of the very general prejudice that it is better fitted for a plaything than a tool; a notion—I will not call it an opinion—that originated very naturally, from the superficial manner in which its study was followed in this country by most of those who aspired to rank among its votaries, even so recently as twenty years ago. It was then little more than the art of distinguishing one plant from another, of allotting to each its learned name and place in an arbitrary system of arrangement, and, sometimes, of adding to these capabilities a remembrance of the qualities of those used as food or medicine. Now, to use the words of a modern writer, one of its most able and industrious professors, "it comprehends a knowledge not only of the names and uses of plants, but of their external and internal organization, and of their anatomy and physiological phenomena; it embraces a consideration of the plan upon which those multitudes of vegetable forms that clothe the earth have been created, of the skillful combinations out of which so many various organs have emanated, of the laws that regulate the dispersion and location of species, and of the influ-

ence that climate exercises upon their development; and, lastly, from botany, as now understood in its most extensive signification, is inseparable the knowledge of the various ways in which the laws of vegetable life are applicable to the augmentation of the luxuries and comforts, or to the diminution of the wants and miseries of mankind. It is by no means, as some suppose, a science for the idle philosopher in his closet; neither is it merely an amusing accomplishment, as others appear to think; on the contrary, its field is in the midst of meadows, and gardens, and forests, on the sides of mountains, and in the depths of mines; wherever vegetation still flourishes, or wherever it attests, by its remains, the existence of a former world. It is the science that converts the useless or the noxious weed into the nutritious vegetable; which changes a barren, volcanic rock like Ascension, into a green and fertile island; and which enables the man of science, by the power it gives him of judging how far the productions of one climate are susceptible of cultivation in another, to guide the colonist in his enterprises, and to save him from those errors and losses into which all such persons unacquainted with botany are liable to fall. This science, finally, is that which teaches the physician how to discover in every region the medicines that are best adapted for the maladies that prevail in it; and which, by furnishing him with a certain clue to the knowledge of the tribes in which particular properties are or are not to be found, renders him as much at ease, alone and seemingly without resources, in a land of unknown herbs, as if he were in the midst of a magazine of drugs in some civilized country."

This department of science, which is now becoming a subject of general interest, in consequence of the new views of the economy of Nature in her development of organic being, that have been obtained by a deeper insight into vegetable anatomy and physiology, cannot but be more especially valuable to those whose pursuits are so intimately connected with the objects of its study, the cultivators of the soil. There may be, doubtless there are still, many such as those of which we have previously spoken as existing thirty years ago, who in the pride of their ignorance, may laugh at and despise the lessons of the theorist as opposed to old practices, the result of the experience that has been handed down from their forefathers; until wakened to slow conviction of their importance by the success of their more enterprising neighbors, and then deplore the time they have lost, and which others have occupied in the steady progress to improvement. The views of the merely scientific man may often, it is true, be only speculative; they may sometimes be in direct opposition to facts, of which he has himself no direct means of becoming acquainted. But who is to test the value of his experiments, unless the man of practice? He alone, in his broader field of inquiry, is competent to detect in their action the errors in minutiæ that have escaped the notice of the chemist in his laboratory, and the naturalist in his closet; he chiefly is to derive the benefits accruing from their united labors; and a knowledge of the leading principles of their science and of natural philosophy in the aggregate will materially assist, nay, is absolutely necessary to qualify him for both the trial and the benefit. It is surprising that the very evident advantages to cultivation that an acquaintance with the structure and vital function of vegetables promises, should have hitherto been so little estimated by the agriculturist: the practical gardener has far anticipated him in the pursuit of inquiries equally essential to them both; although, perhaps, himself in the main, still very distant from acquaintance with a vast body of facts that might be rendered available by his skill. How much, for instance, has a knowledge of the organs and attributes of the flower contributed to the advancement of his art? Let us look at a flower: it is really a complicated object; much more so than many who have long admired and cherished it for its beauty and fragrance have any idea of; or, if they have, have not thought worthy of examination. Its greatest beauty consists not in the gorgeous color, nor its value in the most exquisite odor, but in the admirable adaptation of its parts, and their subservience to the reproduction of its kind.

Take any common flower of the field or garden, only observing that, if one of the latter locality, it is not of the kind called "double," which, however admirable as garden ornaments—and not altogether to be despised by the botanist, on account of the illustrations they afford him of the morbid development of parts to which the individuals of the vegetable kingdom are liable under peculiar circumstances—are not at all calculated to display the unity of design that constitutes the chief object of interest in a perfect flower. Externally, investing the base of the flower, is a series of small leaves, usually of a green color, and from three to five in number, separate, and spreading, as in the buttercup and the peony, or conducted into the form of a cup or vase, as in the primrose or pink: this is the *calyx*, or flower-cup; it covers the rest of the flower in the state of bud, and serves to support and hold together the more delicate internal organs when expanded. Within the calyx is the *corolla* or blossom, composed of leaves, generally of the same number as those of the calyx, which are either white or variously colored, and called *petals;* these are either distinct, as in the rose and the wall-flower, or connected, as in the fox-glove and potato-flower. Within the corolla are the *stamens*, generally thread or wire-like processes, with yellow, or, occasionally, purplish or reddish tips; these are very variable in their size, length and number, in the flowers of different plants; some flowers have only one or two stamens—in the

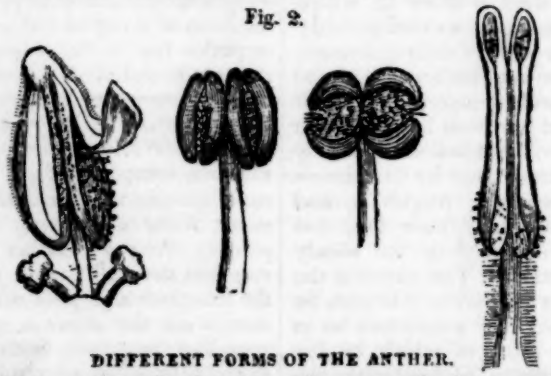
bell-flower there are five, in the tulip six—and in some others they are too numerous to be counted. The stamens surround the *pistil*—so called from the Latin word *pistillum*, a *little pillar* or *column*, or, by a more homely interpretation, a *pestle*: look at the pistil in the flower of the lily; at the lower extremity, where attached to the flower, is a thickish, green body, called the *germen*, or *ovary*, from containing the rudiments of the seeds; the long, wire-like part in which this terminates is called the *style*, and the knob at the extremity of the style is named the *stigma*. Look at the pistil of the tulip; in that the germen is long and three-sided, bearing the curiously three-parted stigma on its summit, and the style is wanting. The pistil is not always solitary; in many flowers there are two, three, or more together; and they are frequently very numerous, as in the common buttercup, where the many little green, pointed grains in the center of the flower are so many pistils. See fig. 1: *a* the calyx; *b* the corolla; *c* the stamens; *d* the pistils.

Fig. 1.

STRUCTURE OF FLOWERS.

In most of the higher orders of plants, all of these parts are present in the perfect flower; and sometimes other appendages, of which we may speak hereafter; but in some there is no corolla, in others neither corolla nor calyx, and in many the stamens and pistils occupy distinct flowers—all very important characters in distinguishing one family of plants from another, and especially deserving of the attention of the cultivator.

Fig. 2.



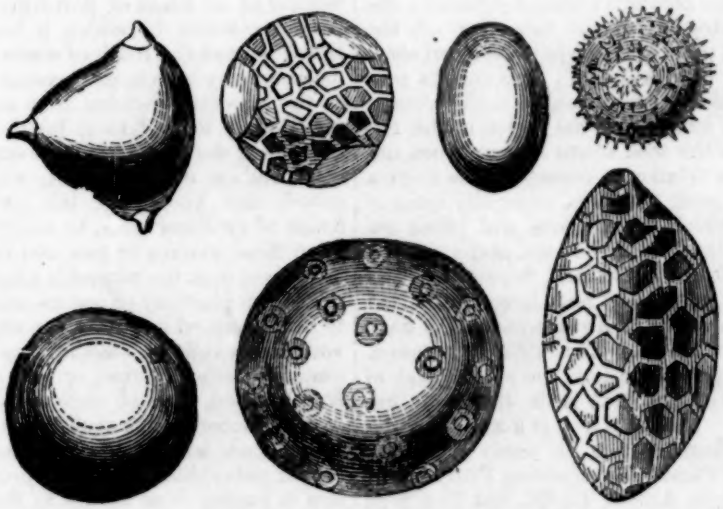
DIFFERENT FORMS OF THE ANTHER.

Of all the parts or organs of the flower, the stamens and pistils are the most essential. The stamen is a very curious body; the lower part, called the *filament*, from its resemblance when very slender to a thread of hair, is frequently absent, the colored tip being attached to the corolla or some other part of the flower; this tip, denominated the *anther*, is a little

case or box, usually double, opening at a certain period on each side, and scattering an exceedingly fine powder, called the *pollen*. The forms of the anther are various, and likewise the modes of opening. (See figure 2.) Thus sometimes, and indeed most frequently, the opening is by a longitudinal slit the whole length of the anther; in many instances it is a small pore or perforation at the extremity, and in others it takes place by a little door or valve turning upward, as shown in our figures.

The grains of pollen are very beautiful objects for the microscope, under which they present a great diversity in size, form, and structure. (See fig. 3.)

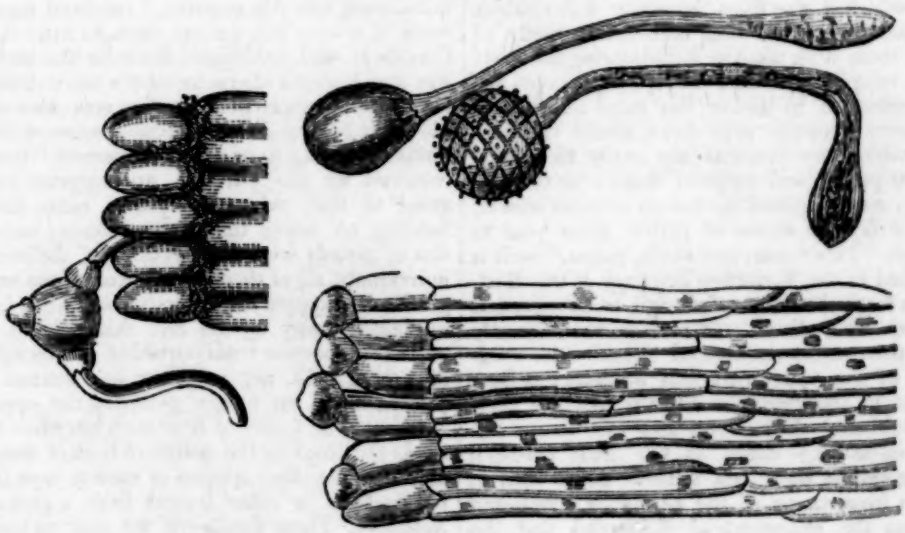
Fig. 3.



GRAINS OF POLLEN MAGNIFIED.

The pollen is an agent of vast importance in the economy of the vegetable kingdom; the maturity of fruit and the production of seed being dependent upon the contact of these minute bodies with the stigma or summit of the pistil. About the period at which the anthers burst and scatter the pollen, the surface of the stigma is seen to be moistened by a viscid secretion, that, occasioning the adherence of such grains as light upon it at the moment of dispersion, so acts likewise upon them as to stimulate the ejection of one or more slender tubes from the surface of each individually; which tubes extending more or less according to the length of the pistil, penetrate through its tissue until they reach the interior of the germen and come in contact with the embryon seeds. In the event

Fig. 4.



POLLEN TUBES.

of this contact not taking place, the seed becomes abortive; and hence in many seed-cases, as those in the common pea, we find only two or three perfect seeds, instead of nine or ten, perhaps, whose rudiments were present. The grains of pollen, examined by

a very high magnifying power, are found to consist of a membrane, inclosing a fluid, in which an infinite number of excessively minute particles are seen in active motion; these contents are eventually discharged through the tube, the grain being left empty. The figures in the 4th wood-cut are intended to illustrate this action of the pollen tubes; of the two larger ones, that with the triangular pollen represents it as taking place on the stigma of the common evening primrose; the other, the descent of the tubes through the stigma and parts of the style of the great snap-dragon or calve's snout. This curious process was unknown to naturalists until recently, though the influence of the pollen in the fertilization of the seed seems to have been understood in relation to certain plants from a period of great antiquity, especially some of those in which the stamens and pistils are produced in different flowers, and occasionally on different individuals, whose male and female attributes must have been recognized by the cultivator before success could have attended his labors. As a striking instance, we may refer to the date, the staple food of the nations of the Arab stock from time immemorial. The date tree is a kind of palm growing abundantly in the sandy and rocky districts of Persia, the adjoining Provinces of Western Asia, Arabia, Egypt, and Northern Africa, and is largely and assiduously cultivated by the inhabitants. A forest of dates is a magazine of provision for a city, and the failure of a crop spreads depopulation through whole provinces; the quantity of fruit yielded by a single tree in each season is, on the average, from two to three hundred weight; every village has its plantation, and even the splendid city of Zenobia derived its Roman name of "Palmyra," and its Arabic and scriptural appellation of "Tamor" or "Tadmor" in the desert, from the groves of dates by which it was from necessity surrounded. These plantations are, of course, chiefly of the trees with pistil or fruit-bearing flowers; but in order to insure a crop, the natives are accustomed to gather the large bunches of flowers from the male dates, about the time at which the stamens are ready to scatter their pollen, and suspend them over the others; nay, to guard against an adverse season, they lay by stores of pollen from year to year. This "marriage of the palms," as it is called in the figurative language of the East, is a festival of too early origin to be recorded even by tradition. So well is the necessity of the process understood even by the wildest of the wandering and predatory tribes, that in carrying war into the lands of their neighbors, they frequently cut down the stem-bearing dates as the most dreadful vengeance they can inflict. Some idea of the importance of the act may be gathered from the statement of Kæmpfer, that the threat only of so doing once put a stop to an intended invasion of a then very formidable power: he mentions, "I remember it happened in my time that the Grand Signior meditated an invasion of the city and territory of Bassora, which the prince of that country prevented by giving out that he would destroy all the male palm trees on the first approach of the enemy, and by that means cut off from them all supplies of food during the siege."

This principle in cultivation, so long understood and made available in that of the date, was afterward found to be applicable in the nurture of all kinds of flowering plants. Of the experiments by which it became established beyond the reach of controversy, or of the means by which our present knowledge of the important fact has been acquired, it is unnecessary for us now to inquire; however interesting the detail, we must wave it for the consideration of the result, viz., the vast power that knowledge has placed in the hands of civilized man, to multiply and enlarge these sources of food and luxury which he derives from the vegetable kingdom, and to which the plasticity of nature seems scarcely to have assigned a limit. The almost endless varieties exhibited among our cultivated plants, whether in root, or leaf, or flower, or fruit, or seed, have all their origin in the reciprocal action of the stamen and pistils; Nature herself has contributed many, but man has far outstridden her slow progress. The bee in passing from flower to flower, carries away stores of pollen destined to form the waxen fabric of his dwelling, and deposits stray particles adhering to his wings and body upon the pistils of others of a different kind; while numerous small flies and beetles are occupied, in their search for food, in impregnating in a similar manner the seeds of one plant with the pollen belonging to another. Hence the uncertainty attending the preservation of cherished varieties of annual plants in cultivation. When the gourd known by the name of "vegetable marrow," was first introduced into this country, I received some seeds of a very fine variety brought from the Continent, and celebrated there for the large size and luscious character of the white fruit; for several years no deterioration was observable; but having sown one season some of the seeds belonging to one large "marrow" fruit reserved for the purpose, my surprise was great to find, when the plants came into bearing, no fewer than three different varieties of gourds were the produce of different individuals, all of them totally unlike the original. This apparent anomaly was afterward explained away by the fact that, while my vegetable marrow was flourishing on one side of a high wall, my neighbor had trained a pumpkin and an orange gourd on the opposite; and the reserved fruit must have had its seeds fertilized by the pollen of both of them, and of some other species or variety brought by the bees or other insects from a greater distance. These freaks—if we may so term them—of Nature are not only productive of occasional loss and disappointment to the cultivator, but even of much greater evil, as

evinced by a circumstance recorded by Ray to have taken place a short time previous to the promulgation of the discoveries of Sir Thomas Millington respecting the functions of the flower. It appears that a market-gardener of Brentford, named Richard Baal, sold a quantity of the seed of the cauliflowers at that period bearing a very high price, to a number of persons carrying on the same trade in the vicinity of the metropolis, who, having sown it in the usual way, were surprised and alarmed on finding that, instead of cauliflowers, it produced a kind or variety of cabbage then in common use, and known as the long-leaved, probably resembling some of the coleworts or kales of the present day. Enraged at their loss, and attributing it to dishonesty on the part of Baal, they joined in a prosecution against him. The trial took place in Westminster Hall, where he was adjudged to be guilty of fraud, and sentenced not only to pay back the price of the seed, but to compensate the gardeners for their loss in cultivation, and the diminished value of their expected crop. Thus was poor Baal ruined both in fortune and character by the ignorance of his judges, who, had they been acquainted with the true state of the case, would in all probability have acquitted him of all fraudulent intention, attributing the mishap to the accidental impregnation of the pistils of the cauliflower by the pollen of the colewort, through the medium of insects, or wafted by the wind.

To attempt a detail of the advances made in Horticulture and Agriculture, particularly in the former, since the time of Baal, solely in consequence of our knowledge of a fact that, unknown, caused his ruin, would be an all but interminable task. The natural varieties of esculent and ornamental plants were then comparatively few: those artificially obtained since are now approaching to a number the extent of which it is impossible to foresee or calculate; their name is already "Legion." The most astonishing examples are to be found in the annals of the florists, the cultivator of geraniums, roses, heaths, and pansies. The art which has successively produced their hundreds and their thousands, differing only in the form or arrangement of a petal or the disposal of its tints, a spot or line may perhaps be regarded with contempt by those whose pursuits are directed to an end more immediately and obviously useful; but, without seeking to oppose their prejudices by tracing the necessary association between the elegant and the useful in elevating man in the scale of being, let me remind such persons that the plastic power of Nature is equally efficient in enlarging a root and seed as it is in varying the colors of a flower, and that the same means differently directed will effect both. How else the vast diversity of our home-grown fruits, almost equaling in many kinds, and in some surpassing those of our garden-flowers? The varieties of the apple alone—the most valuable of them all—amount to about two thousand; yet all of them are derived from two original species, viz., the *malus acerba*, the harsh and sour crab-tree of our forests, and the *malus mitis*, or sweet apple of a milder climate; both of which are by some botanists considered to be natural varieties of the same, though their origin cannot now be traced. These two thousand varieties, about one thousand kinds of pear, and half of the latter number of cherries and plums individually, have all originated from seed, and are indebted for their peculiarities in flavor, hue, and form or size, to the pollen with which that seed was fecundated. That which has been effected with regard to fruit and flowers is equally possible with roots and grain, as well as other vegetable products requiring cultivation on a large scale. If by crossing the breed in cattle the agility and muscular forces of the horse have been improved, adapting him to the various purposes for which his powers are required, the flesh of the ox and sheep rendered more palatable and nutritious, and the wool of the latter increased in fineness and quantity, the attributes of the plant may be called forth and rendered more subservient to the wealth of the agriculturist by similar means. The plant and the animal are both organic structures, subject to the same general laws of development and reproduction, of improvement and deterioration; and in permitting the manifestation of those laws, though only to the slight extent of our present knowledge, Nature has bestowed on man a power of forestalling, for his own immediate purposes, changes that, under her own dominion, would perhaps never take place, or but after the lapse of thousands of years.

We might pursue this subject much farther, but it would carry us beyond the ordinary limits of a lecture; and as my purpose in this, the introductory one of a course of some extent, is rather to call your attention to the science of Botany as one of practical utility, than as a mere source of amusement, if that purpose has been attained it will be sufficient for the present. In our next, some detail of the functions and organs by which vegetable life is maintained will be necessary to the understanding of those that will follow. The cultivator of plants who knows nothing of their anatomy and physiology is much in the same position as the quack who undertakes to lop off a man's limb without knowing the veins and arteries he must sever in the operation, or who prescribes a course of diet or medicine, ignorant alike of the nature of either, and of the vital energies through which he expects them to prevail. [London Farmer's Magazine

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To Destroy Thistles.—Mow the plants close by the ground, split open the root stalks, and put salt in the opening.

MADDER.

In the last number we evinced our desire to have the latest and most authentic information on the Culture of Madder as a crop adapted to the United States.

But what is needed in this, as in all similar cases, is the most recent actual experience. A frank, full, honest statement of expenditure, both of labor and money, as well as of the income. If half were true that has been published in favor of the cultivation of madder, one would suppose it should have spread before now, like the cultivation of tobacco, until, like that, as well as some other things, it should have broken down by its own expansion.

We have no difficulty in learning enough about the commercial and agricultural history and uses of madder in other countries, and even in our own, going back to its culture in South Carolina before the Revolution. It may, indeed, be instanced here as a proof of the abundant materials at our command, for illustrating topics on which our patrons desire to have information, to state, that in this case we have within arm's reach twenty different works in which the subject of madder is treated in some of its relations to Agriculture and the industrial arts, and more than double that number of essays and communications in reference to it in the various annals of industry. But, in turning from one branch of his business to another, so different from his usual routine, the American Farmer wishes to know, if to be had, the actual results of experiments made by one of his own countrymen, working under circumstances analogous to his own, and if these results give reasonable assurance of profit, then, as with our correspondents from Arkansas and Virginia, they naturally inquire, Where can we get the materials—the seed or the roots—and the price? ☞ The price is always wanted. On this point we are promised farther information by Mr. Allen, in a day or two. He says several attempts here to raise madder from the seed have failed, and recommends writing to friend BATEMAN, of the Ohio Cultivator, Columbus, who will please consider himself, on seeing this, as having been *served with notice.*

The quantity of madder imported and entered for consumption, in Great Britain, in 1832, was as follows, the first, we suppose, meaning *ground* madder:

Madder	60,340 cwts.	—equal to	6,758,752 lbs.
Madder root	51,769 "	"	5,797,904 "
Being			12,556,656 lbs.

Supposing one-third of that amount to be used in the United States, we should have 4,000,000 pounds, which at 15 cents, about the average price, would be $600,000, now sent out of the country for an article to which our soil and climate are as well adapted as to the sweet if not the Irish potato.

But we are left to conjecture as to the amount imported; for, while many other articles of less importance are given in the Secretary's Report—such as *woad*, or pastel, barilla, vinegar, statuary, burr stones, nuts, berries, crude antimony, &c. &c.—*madder* is smothered up in the mass of *non*-enumerated articles. But being an item in which *agriculturists* are deeply concerned, who takes the trouble to care about the legislation relating to it? Yet surely this greatest interest of the nation labors under disadvantages and burdens enough, without

expressly putting out or withholding the lights that might serve to disclose, and perchance to remedy some of them!

Where was the vigilant representative of the agricultural interest? Where the vigilant Committee on Agriculture, to look after this item in the adjustment of the Tariff, with such effect as that we find the present "Free Trade" Tariff protecting it with a duty of *five per cent.* on the imported article, and the late more protective Tariff of 1842 encouraging the American production by letting in the product of the Dutch cultivator *entirely free!* Think you that the manufacturer was not there, looking closely after *his interest?*

After all, however, what we imagine is most to be apprehended is the amount of labor demanded for its cultivation when conducted in a manner to bear any comparison with what we see is applied to it in Holland and elsewhere in Europe. Still, with Government encouragement, comparable with that which is extended to some other branches of industry, it would take root and become an established item of our agricultural staples, and so far relieve other branches, where production is so much beyond all remunerating demand. In many new enterprises of this sort, half the difficulty consists in the timidity and irresolution of those who contemplate them. Especially is this the case with men whose habits of life are anything but encouraging to intellectual versatility and enterprise. Another bar to the general culture of madder is the long time—several years—that elapses between the seed time and the harvest—demanding the exercise of a quality of all others the most incompatible with the genius of the American people.

We proceed to give one out of the many communications before us, because it seems to be among the most recent and nearest home. The result of still more recent ones shall be sought for, and given as they come to hand.

From the Albany Cultivator.

THE MADDER CROP.

Hon. J. Buel—*Sir:* As I consider the madder crop to be one of importance, as well to the grower of the article as to the country at large, I deem it proper to send you a few lines, giving some details of the most improved method of cultivating and preparing the article for use; which, if you deem them worthy a place in the Cultivator, you are at liberty to insert.

The land best adapted to this crop is a retentive, strong loam soil, moist, but so situated that the water may pass off in the wet seasons of the year. The plant accommodates itself to almost any soil; for I last fall harvested a piece that yielded at the rate of five thousand pounds to the acre, (in hills,) which was in a dry, loamy soil, suitable for the wheat or corn crop.

The method of planting has been formerly in hills, from four to six feet apart. The hills yielded from two to three pounds of ground madder each, on good land.

Madder growers have lately made great improvements in the mode of planting. The drill method was introduced two or three years since, and is now the only way practiced by those who raise madder in any considerable quantities. The first drills that were planted were set in single rows, about six feet apart and eighteen inches from plant to plant. These were found to be too near together, both for the good of the crop and the convenience of tending it. It is now ascertained that the best method of planting madder is in beds six feet wide, with four rows of plants to a bed, leaving a space between the beds nine feet wide unoccupied; or it may be planted with rows of corn or potatoes the first season. This space is useful for various purposes, as passing with a team to carry manure, should it be considered necessary during the first and second seasons. The manure should be cropped between the beds, and mixed with a plow before it is used in beds.

Particular care should be taken at the time of planting, that the ground be not too dry. It should be covered with clear, moist dirt, about two or two and a half inches deep. Soon as it has come up, it should be carefully hoed and cleared from weeds. When it is six or eight inches high, the tops should be covered up nearly to the ends, and covered again as soon as they are six or eight inches high as before. In the fall, before the frost kills the tops, they should be covered entirely up. It is then left to lie till the next spring. It should be managed in the same manner

during the second as the first season; but requires only two dressings before covering up in the fall. During the third season it should be dressed once certainly, and twice if practicable; and by this time the tops may be expected to cover the ground nearly from one bed to the other. During the fourth season, it requires no attention till the time for digging, which may be any time in the months of September or October. At digging time, the tops should be cut off with a scythe, and rolled out of the way; then, with a plow, cut a deep furrow on each side of the bed; afterward take dungforks and shake the dirt from the roots. They may then be picked up. Proceed in this manner till the whole bed is dug, washed clean, and dried in a hop-kiln. A stove is preferable to charcoal for drying. Fifty bushels of roots may be dried in a kiln 12 feet square. They should be turned while in the kiln, at least once in six hours, until they are thoroughly dried, which takes from 36 to 40 hours. When taken out of the kiln, they should be taken immediately to the mill for grinding. Madder has formerly been ground in grist-mills, but a much more convenient and economical way, is to grind in cast-iron mills, constructed expressly for grinding madder. They also answer a valuable purpose, for grinding coarse grain for provender, in sections of country where grist mills are not near by. They may be propelled by horse power, (one horse being sufficient,) or by water power if it is convenient. One of these mills will grind 800 or 1,000 pounds a day with one horse. Improved mills of this kind can be obtained by applying to me at West-Winfield, Herkimer county, or Lester Curtis, Nelson, Madison county. Orders for mills will be promptly attended to; price $20.

The following bill exhibits nearly the cost of cultivating an acre of madder, including the expense of digging, drying and grinding:

Seed per acre	$32 00
Interest of land 4 years, at $40	11 20
Plowing and harrowing twice	2 50
Planting	2 00
Dressing first year	8 00
Do. second year	7 00
Do. third year	3 00
Digging	21 00
Drying, 25c. per cwt	12 50
Grinding, 25c. per cwt	12 50
Total cost	$111 70
Product, if well cultivated, 5,000 lbs. at 20 cents per lb	$1,000 00
Deduct cost	111 70
Net profit	$888 30

A good crop of madder looks small the first season, but those interested need not be discouraged. I have now planted nine acres, and shall be ready at the season for digging to supply seed to a considerable amount Those who wish for seed had better obtain it in the fall. Quantity per acre, as I plant, 8 bushels.

Price of seed: under 6 bushels, $4 per bushel; over 6 and under 12 bushels, $3 50; over 12 bushels, $3.

HERBERT WOODBERRY.

West-Winfield, N. Y., July 20, 1835.

In our next we will give a supplementary communication from Mr. Woodberry.

A GREAT OPERATION PROPOSED.

Extract from a Letter to the Editor of The Farmers' Library.

* * * "The domain I told you of is in Pickens District, South Carolina, and contains more than 100,000 acres—beginning, say two miles above the mouth of Chatuga River; running up that stream to about the dividing ridge between Village Creek and Tomassee Creek; across, along it several miles, and thence sloping wider to embrace the country of the Chauga, and extending toward the source of Long Nose Creek; then making a detour to complete the circumscription at the Chatuga. I took the State Geologist all over it. He thought it one of the most beautiful and interesting portions of the State. The forest is particularly fine—the "range" superb. No loss from rocks; almost every acre cultivable; the soil good, resulting from decomposed hornblende, grantic slates, &c. As the hills are in ranges, the roads are surprisingly good. Iron ore, of several sorts, abundant. Lime, gold, &c. are known to exist. Water-power pervading and immense. The navigable waters of Tugola River are only three miles distant from its western limit, and the Greenville Railroad will come within some twenty miles of its eastern. The cheapest, easiest, healthiest and most natural route for connecting with the West, either by canal or railroad, is up the Tugola, through the Rabun gap, and down the L. Tennessee. [See the map.]"

The owner's motive for selling is with him a very natural one. Having very large possessions besides, enough to employ all his time, he would find it more

convenient to convert this property into some other form that should place the proceeds more immediately under his own supervision and management.

The Editor of THE FARMERS' LIBRARY has authority to form a Company for the purchase of the above property, belonging to a gentleman than whom the Union does not contain one of purer or more exalted character in "all that can give assurance of a man" of intelligence and probity. It is probable that the property may be had on *long time;* and that it affords a rare scope for the establishment of foundries and factories, and for a walk that would maintain 20,000 sheep. We publish the extract to open the eyes of the public to the opportunities that offer for investment near at home, in old, civilized regions, blessed with health and social advantages, instead of wandering away to distant and sickly frontiers, there to be overrun or swept along by and with the restless and eager crowds pressing onward to the shores of the Pacific. The better way would be to form a company here, and make a payment in the way of forfeit, securing time to go to Europe and engage settlers.

STATE AGRICULTURAL SOCIETY OF SOUTH CAROLINA.

AT a late meeting of this Society, proceedings were had which indicate that those who carry it on are looking to something beyond and *above* the mere ephemeral influence of exhibitions of rare things, such as large mules and sleek horses. They are for setting and keeping the *mind at work*, to look into the sources of public evils and of public prosperity, and to expose and lay them bare in such manner as that men of patriotic impulses may the better and more certainly accomplish the noble purposes for which such men are born to society. After calling Gen. Allston to the chair, Mr. Seabrook offered the following resolutions, which he advocated at considerable length:

Resolved, That Committees be appointed for the following purposes, viz:

1. A Committee to report on the defects of the present Free School system, and the changes necessary to insure the accomplishment of the end for which it was established.
2. A Committee to report a plan by which the agricultural capabilities of South Carolina might be accurately ascertained, accompanied by suggestions for their early development and improvement.
3. A Committee to prepare a digest of the views affecting the slave population of the State, and to report such as, in their judgment, ought to be repealed or amended, and whether farther legislation on the subject is required by policy or the public interests.
4. A Committee to report on the expediency of lowering the legal rate of interest.
5. A Committee to report on the expediency of changing the present mode of working the public roads.
6. A Committee to ask of the Legislature the immediate abolition of the lottery license.

We shall wait with hope and anxiety for the reports which may be expected under these resolutions. We trust the Committees will inquire particularly into the effect of the *rate of interest* on the interests of Agriculture, and whether any plan may be devised that will place within the reach of prudent cultivators the means of profitable improvement of their estates. That the whole face of the country might be so improved, if capital could be placed in combination with prudence, and with a reasonable degree of skill, such as distinguishes those who, with *better preparation*, follow other pursuits, we have but little doubt.—The whole question, however, is one of the gravest character, to be entered upon with care and circumspection to elucidate it. One thing is very certain, that there exists some strong attraction drawing capital and intellectual energy *from the country to the towns*, which it becomes those who pretend to represent the country to look into. And here we venture to propose this as a fitting subject

for inquiry by the *Agricultural Committees, so called, appointed in the several State Legislatures.*

There is, beyond its limits, and especially south of it, a decided impression that Agriculture is in a very flourishing condition in Western New-York. Our own view of it, along the great lines of travel, would not justify that impression. The country there generally wears a half-worn-out and about-to-be-deserted aspect. Fences are generally indifferent; houses look old and ragged, few of them newly painted; very few new gardens, and orchards, and plantations of ornamental trees about the farm-houses. On remarking upon these appearances to a plain, shrewd, sensible farmer near Saratoga Springs, last summer, and asking his explanation, and desiring to know what became of the net income, more or less, which is said to remain with most of them at the end of the year, and why it was not applied to improving the appearance and productive powers of their estates, so as to give to the eye of the traveler that delightful picture which is presented by countries in a course of general melioration, he answered promptly that the reason was to be found in the laws of the State *regulating interest.* As long, he said, as a farmer could, without the labor of cultivation, send his surplus money, much or little, *to the city of New-York, to be invested in "bond and mortgage" at 7 per cent.* he would neither appropriate it to the purchase of more land or to the improvement and brushing up of what he had; or, at least, it would be rarely done. It would be a curious result, by-the-by, if one could ascertain *what proportion of the State and City of New-York is under "bond and mortgage"!*

We would like to have an essay on this subject, such as we anticipate from the South Carolina Committee, and such as Mr. CAREY, of Philadelphia, or Mr. C. F. MAYER, of Baltimore, might supply. All we can do is to offer the 2 vols of THE FARMERS' LIBRARY—not for their value to such writers, but as a token of the importance we attach to the subject, and in the hope of being favored by those who have turned their minds that way, and with whom pecuniary compensation would be no object; and, if it were, we are not able to offer it.

There are millions of acres of land in Maryland and Virginia that, were they in England, would bring an annual rent far exceeding their fee simple value in this country. How is this? Certainly not from difference in the value of agricultural products or the cost of agricultural labor in the two countries, considerable or great as that is. Is it because we have *all land and nothing else?* Neither is it, we apprehend, that the capital, if it existed, to be applied with tolerable judgment to Agriculture, would not well remunerate the investment. What is it? The question is of much more importance for Agricultural Societies and Committees than how to make the fattest hog in the shortest time.

WILLIAMSON POTATOES,

FROM THE PLAINS OF BOGOTA.

MR. SKINNER: NEW-YORK, Jan. 12, 1847.

Sir: You will please to accept, for yourself and friends, the inclosed lot of potatoes. They came from the plains of Bogota, in the Republic of New-Grenada. I sent for them for the purpose of getting new seed. I have sent for a few bushels more and any of your friends who are in want can be supplied gratuitously by leaving their names with you. Also, a few dozen of the Yuca plant. There is no particular name for the Potatoes.

Yours, J. D. WILLIAMSON, 476 Broome-st.

Reply to the above.

Dear Sir: The potatoes alluded to have been received and distributed to persons who will be careful in the cultivation, and report the result. Looking back

to the volumes of the American Farmer, which I founded and edited nearly thirty years ago, you will find that in the numberless cases of fruits, plants, animals and fowls received from abroad, and especially from officers of the Navy, I always insisted, where they bore no particular name, on the policy of calling them after those whose public spirit had led them to procure and import them for the benefit of our country; and the public should honor more highly, if it knew its own interest, actions like these, and the fame they deserve, than ————. The public taste, however, is far otherwise, and powerless would be the effort of an individual to change it.

I have accordingly given to these the name of the Williamson Potato; and have registered your note, on the principle that all such things should be preserved, as the means of tracing the history of fruits, trees, vegetables, animals, &c. to which they may refer, and which in time to come may be the subject of curious and interesting inquiry, as has been the introduction of coffee, tobacco, &c. in Europe. The YUCA will, when it arrives, be thankfully received, and distributed in the South. Should it succeed there, it may be coaxed along to the North in process of time, though it may be against the general tide of migration,

Respectfully, your ob't servant, J. S. SKINNER.

INDIAN CORN AND ITS VARIETIES.

THE most remarkable specimens that we have ever seen accompanied the letter from which the following extract is made.

There are few things in nature more remarkable than the *invariableness of an even number* of rows on corn. The procreation of male and female by the *pigeon* is said to be not without exceptions. Is it so? We have seen ears of corn which commenced with a certain number, always even, at the end attached to the stalk —say 12 rows—and which, for some reason, perhaps dry season or failure of manure, it could not complete, and accordingly *changed the number*, and run into a smaller one, say 10, but always dropping so as to maintain an even number. We recollect to have seen an ear at the Newcastle (Del.) Exhibition, where this change took place twice in the growth of one ear, so that it *ended* with four rows less than it began; but, what is remarkable, it never drops one, or three, or any other odd number of rows.

We had once, many years ago, nigh got into a scrape by saying that we had seen an ear of corn with 40 perfect rows. It was the yellow gourd seed, (and in fact, we have seen them not unfrequently) on a farm where ears of the largest number of rows had been selected for seed for a succession of years.

The fact is that grains and vegetables may be bred to run into excess, as well as animals, in particular points and qualities; but climate, after all, will not be forced to adopt what any willful experimenter may choose to transplant from one region to another. The large corn of the South can't be forced upon the North, nor *vice versa*.

We question if any man in the Union has experimented with this noble grain, in as many varieties of kinds and ways, and with as much intelligence, perseverance and success as the writer of the following.

We had written thus far before we saw again that the writer had forbidden the use of his name. We received the letter while Assistant P. M. General at Washington, and then distributed the corn. Since then, far from having ground

to cultivate, feel but too glad to have enough to stand upon, and health and heart to work for corn enough to eat.

LONG CREEK, Louisa Co., Virginia, May 25, 1844.

Sir: I think it probable the gourd seed corn which I cultivate (marked No. 1) is similar to that mentioned in your note to the Editor of the Southern Planter, published in February last.

I cultivate several kinds of corn which I consider very valuable; indeed, I have never seen any which I consider equal to them. Samples of five kinds accompany this note; they are the result of 30 years' crossing and experimenting with many varieties of corn.

In the year 1839, I raised corn so large that nearly a quart was shelled from a single ear. I found one ear with 44 rows upon it, and upward of 50 grains in each row. Each package sent herewith is marked with the number of rows, and of grains upon the ear, shelled, and put into it. I prefer No. 3, though No. 2 is excellent, and No. 1 will produce more bushels but not many more pounds than Nos. 2 or 3. I measured an ear of No. 4, which grew upon thin land, that was twelve inches long. It is heavy, sound corn, fine for bread. No. 5 will grow well upon very poor land. I do not recollect that I ever gathered a decayed ear of it I raise it to feed horses and hogs. It is heavy, nutritious, and very productive. Nos. 2, 3, 4 and 5 will weigh from 57 to 60 lbs. per bushel of 2,178 cubic inches.

If, upon examination, you incline to cultivate any one of the kinds accompanying this note, I will send it to Baltimore by a steamboat from Richmond, to the care of any person you may name. But perhaps it will be safest to plant the samples and see the product before you make a selection.

This note is not written to acquire notoriety, or to see my name *in print*. Far from it.—I do not raise corn for sale; and, if you wish to cultivate any of the kinds I send you, it will give me pleasure to furnish you seed, without charge.

Yours, respectfully, W. N., of Louisa.

To J. S. SKINNER, Esq.

PRICES CURRENT.

[*Corrected, January 23, for the Monthly Journal of Agriculture.*]

ASHES—Pots, 1st sort	℔ 100 lb.	4 87½	@ 5 —
Pearls, 1st sort, '46		5 43¾	@ — —
BEESWAX—American Yellow		— 26½	@ — 27
CANDLES—Mould, Tallow	℔ lb.	— 9	@ — 10½
Sperm, Eastern and City		— 36	@ — 38
COTTON—From	℔ lb.	— 10½	@ — 13½
COTTON BAGGING—American		— 10½	@ — 13
CORDAGE—American	℔ lb.	— 11	@ — 12
DOMESTIC GOODS—Shirtings	℔ y.	— 5	@ — 11
Sheetings		— 6½	@ — 15
FEATHERS—American, live		— 25	@ — 27½
FLAX—American		— 7	@ — 8
FLOUR & MEAL—Genesee	℔ bbl.	5 62½	@ 5 68¾
Troy		5 62½	@ 5 65
Michigan		5 56¼	@ 5 62½
Ohio, Flat Hoop		5 56¼	@ 5 62½
Ohio, Round Hoop		— —	@ — —
Ohio, via New-Orleans		5 37½	@ 5 50
Pennsylvania		5 12½	@ 5 25
Brandywine		5 50	@ — —
Georgetown		5 50	@ — —
Baltimore City Mills		— —	@ — —
Richmond City Mills		6 75	@ 7 —
Richmond Country		5 25	@ — —
Alexandria, Petersburg, &c.		5 25	@ — —
Rye Flour		4 —	@ 4 12½
Corn Meal, Jersey and Brand.		3 87½	@ 4 12½
Corn Meal, Brandywine	hhd.	17 50	@ — —
GRAIN—Wheat, White	℔ bush.	1 15	@ 1 18
Wheat, Western, Red		1 06	@ 1 12½
Rye, Northern		— 85	@ — 86
Corn, Jersey and North	(meas.)	— 78	@ — 80
Corn, Southern	(measure)	— —	@ — —
Corn, Southern	(weight)	— 78	@ — 80
Oats, Northern		— 43	@ — 45
Oats, Jersey		— 40	@ — —
HAY—North River in bales	℔100 lb	— 56¼	@ — 62½
HEMP—American, dew-rotted	ton100	—	@115 —
" " water-rotted	150	—	@200 —
HOPS—1st sort, 1846		— 9	@ — 11
IRON—American Pig, No 1		30 —	@32 50
" Common		22 50	@25 —
LIME—Thomaston	℔ bbl.	— 70	@ — 75
LUMBER—Boards, N.R.	℔M. ft. clr.	30 —	@35 —
Boards, Eastern Pine		— —	@ — —
Boards, Albany Pine	℔pce.	— 10	@ — 18
Timber, Georgia Pine	℔M. ft.	24 —	@28 —
Staves, White Oak, pipe	℔ M.	50 —	@ — —
Staves, White Oak, hhd		40 —	@ — —
Staves, White Oak, bbl		30 —	@ — —
Staves, Red Oak, hhd		24 —	@28 —
Hoops		20 —	@30 —
Scantling, Pine, Eastern		15 —	@16 25
Scantling, Oak		30 —	@35 —
Timber, Oak	℔ cubic foot	— 20	@ — 30
Timber, White Pine		— 13	@ — 20
Timber, Georgia Yellow Pine		— 24	@ — 28
Shingles	℔ bunch	1 75	@ 2 —
Shingles, Cedar, 3 feet, 1st quality		26 —	@ — —
Shingles, Cedar, 3 feet, 2d quality		22 —	@24 —
Shingles, Cedar, 2 feet, 1st quality		17 —	@18 —
Shingles, Cedar, 2 feet, 2d quality		15 —	@16 —
Shingles, Cypress, 2 feet		13 —	@14 —
Shingles, Company		28 —	@30 —
MUSTARD—American		— 16	@ — 31
NAILS—Wrought, 6d to 20d	℔ lb.	— 10	@ — 14
Cut 4d to 40d		— 4	@ — 4½
PLASTER PARIS—℔ ton		2 12½	@ 2 25
PROVISIONS—Beef, Mess, ℔ bbl		9 —	@ 9 75
Beef, Prime,		7 —	@ 7 50
Pork, Mess, Ohio		12 25	@ — —
Pork, Prime, Ohio		9 75	@ — —
Lard, Ohio	℔ lb.	— 8	@ — 8¾
Hams, Pickled		— —	@ — 7½
Shoulders, Pickled		— —	@ — 5½
Sides, Pickled		— —	@ — —
Beef, Smoked	℔ lb.	— 7½	@ — 8
Butter, Orange County		— 18	@ — 19
Butter, Western Dairy		— 13	@ — 15
Butter, Grease		— —	@ — 7
Cheese, in casks and boxes		— 6½	@ — 7½
SEEDS—Clover	℔ lb.	— 6	@ — 7½
Timothy	℔ tierce	12 —	@15 —
Flax, Rough		9 —	@ 9 25
SOAP—N. York, Brown	℔ lb.	— 3½	@ — 5½
TALLOW—American Rendered		— 8	@ — 8½
TOBACCO—Virginia	@ lb.	— 1¾	@ — 5
North Carolina		— 2	@ — 3
Kentucky and Missouri		— 2	@ — 6
WOOL—Am. Saxony, Fleece	℔ lb.	— 35	@ — 37½
American Full Blood Merino		— 30	@ — 32
American ½ and ¾ Merino		— 26	@ — 28
American Native and ¼ Merino		— 22	@ — 24
Superfine, Pulled		— 25	@ — 28